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February 28, 2003
EM-97-0616

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Mr. Gene Jablonowski
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Chicago, IL 60604-3590

RECORD COPY

Mr. David Snyder
Archeology Reviews Manager
Resource Protection and Review
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Columbus, Ohio 43211-1030

I-300 35-0010

Dear Madam/Sir:

ENVIRONMENTAL ASSESSMENT FOR QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

The United States Department of Energy (DOE) is proposing to conduct cleanup activities in the eastern portion of the plant reservation (Quadrant II) at the Portsmouth Gaseous Diffusion Plant located in Piketon, Ohio. DOE has prepared an Environmental Assessment (EA) to analyze the potential environmental consequences of this proposed action and its alternatives. This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations implementing NEPA, and the DOE NEPA regulations.

Based on the result of the Environmental Assessment analysis, DOE has determined that the proposed actions do not constitute a major Federal action that would significantly affect the quality of the human environment. Therefore, the preparation of an Environmental Impact Statement is not required. The basis for this determination is explained in the enclosed Finding of No Significant Impact (FONSI) and the supporting EA.

If you have any questions, please contact Matt Vick of my staff at (740) 897-2089.

Sincerely,

Russell J. Vranicar
Acting Site Manager
Portsmouth Site Office

Enclosure

cc w/enclosure:
David Page, SE-30-1/ORO
David Allen, SE-30/ORO
Administrative Records
Gil Drexel, BJC/PORTS

U.S. Department of Energy
Oak Ridge Operations, Oak Ridge, Tennessee

FINDING OF NO SIGNIFICANT IMPACT FOR QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT, PIKETON, OHIO

AGENCY: Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY: The U.S. Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA-1459, for Quadrant II Corrective Measures Implementation at the Portsmouth Gaseous Diffusion Plant (PORTS) in Piketon, Ohio. Proposed corrective measures implementation activities at the two areas of concern, the X-701B Holding Pond and Retention Basins Area and the X-701B Contaminated Groundwater Area, include a wide range of corrective measures technologies and methods that were evaluated as part of the Quadrant II Corrective Action Study/Corrective Measures Study (CAS/CMS). These ranged from institutional controls to removal of all contaminated soil, subsurface piping systems installation, and installation of an engineered cap for the X-701B Holding Pond and Retention Basins. For the X-701B Groundwater Plume Area the potential corrective measures ranged from institutional controls to various combinations of ex-situ and in-situ treatment including bio- and phyto- remediation and steam stripping/electrical resistance heating with vapor extraction.

Because a decision has not been made regarding Ohio EPA and U.S. EPA's preferred corrective measure method, all of the reasonably foreseeable corrective measures were included in the proposed action for evaluating potential impacts. This bounded the analysis as reasonably as possible to assure Ohio EPA and U.S. EPA's preferred action has been assessed.

Based on the analyses in the EA, DOE has determined that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment, within the meaning of the *National Environmental Policy Act* of 1969 (NEPA), 42 U.S.C. Code §4321, et seq. Therefore, the preparation of an environmental impact statement (EIS) is not required, and the Department is issuing this Finding of No Significant Impact (FONSI).

PUBLIC AVAILABILITY: Copies of this EA and FOSNI are available from:

U.S. Department of Energy
Public Reading Room
230 Warehouse Road, Building 1916-T2
Suite 300
Oak Ridge, Tennessee 37831

U.S. Department of Energy
Environmental Information Center
3930 U.S. Rt. 23
Perimeter Road
Piketon, Ohio 45661

For further information concerning the DOE NEPA process, contact:

David R. Allen, NEPA Compliance Officer
U.S. Department of Energy
Oak Ridge Operations Office
Post Office Box 2001 MS-SE32
Oak Ridge, Tennessee 37831-8540
(865) 576-0411

PUBLIC PARTICIPATION: In November 2002, the DOE Oak Ridge Operations Office published a public notice in the local newspapers informing affected and interested stakeholders of its intention to implement corrective measures in Quadrant II at PORTS. Availability of the copies of the Environmental Assessment for review by the public was identified in this notification. Written comments were solicited from reviewers with the comment period being closed on December 6, 2002. Written responses to questions and comments submitted as a result of these reviews have been developed and utilized in the finalization of the EA. DOE's responses to all comments were provided directly to their originators.

DESCRIPTION OF PROPOSED ACTION: Under the proposed action, the following corrective measures may be used individually or in combination to reach remediation goals at the X-701B Holding Pond and Retention Basins Area:

Institutional controls

These alternatives describe land deed restrictions that limit residential and commercial land development and access controls to prevent exposure to contaminated soils. There are no remedial actions being conducted. Once the on-site presence of DOE/USEC has ceased, it may be difficult to control future activities and, therefore, there is an increased risk of potentially exposing future site personnel or the public. Activities associated with site cessation, such as development of land use controls, may require additional NEPA review.

Minor soil removal

This alternative involves the excavation of the X-701B Holding Pond and Retention Basins and then backfilling with clay material. The total amount of contaminated soil to be removed is estimated to be in the range of 81,000 ft^3 to 110,000 ft^3. Plant administrative control would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding requirements for appropriate personal protective equipment and requirements for proper disposal of any soil removed from the excavated area. Waste generated under this corrective measure would be primarily Low Level Radioactive and would require disposal at an authorized off-site treatment, storage, and disposal facility or an on-site disposal cell.

Minor selective removal, and capping

The X-701B Holding Pond and Retention Basins would be backfilled with clay to build up the existing topography in support of subsequent capping layers. The total amount of contaminated soil to be removed outside the capped area is estimated to be 270 ft^3 to 40,000 ft^3. The caps will be engineered to meet RCRA Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements. The cap, combined with berms and ditches, would reduce water infiltration through the contaminated soil area and direct surface water around the perimeter of the cap and into the drainage ditch that flows into X-230J7 East Holding Pond.

Plant administrative control would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding the type of soil contamination beneath the cap, requirements for appropriate personal protective equipment, requirements for proper disposal of any soil removed from the excavated area, and requirements for maintaining the cap in its original condition.

Extensive soil removal

The X-701B Holding Pond and Retention Basins would be excavated to remove soil contaminants. The excavation would then be partially backfilled with clay and graded to drain into the existing drainage system. The X-701E Neutralization Building and several existing monitoring, injection and extraction wells in the area as well as the X-747G Precious Metal Scrap Yard may require relocation/demolition depending on the extent of excavation. The relocation/demolition of the X-747G yard, if necessary, would also require the disposal or relocation of the material currently stored in and around the yard as well as some adjacent structures and power poles. The total amount of contaminated material to be excavated under this scenario could range from 40,000 ft^3 (selective removal) to over 2,100,000 ft^3 (complete removal). As much as 80,000 ft^3 of the excavated material (primarily soil below the water table) is expected to be mixed (RCRA hazardous and Low Level Radioactive). The rest is expected to be Low Level Radioactive. Waste generated as a result of these actions will be disposed of at a treatment, storage and disposal facility licensed to handle this type of material.

Plant administrative controls would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding requirements for appropriate personal protective equipment and requirements for proper disposal of any soil removed from the excavated area.

Removal of piping system

The X-701B Holding Pond's existing pump and associated piping located within the holding pond and surrounding areas would be removed.

Construction of disposal cell with leachate collection

The X-701B Holding Pond and Retention Basins would be excavated, including the removal of the existing pump and associated piping located within the holding pond and surrounding areas. The excavated material would be temporarily staged on-site and the resulting depression would be converted into an engineered disposal cell with an underlying liner system (including leachate collection) and engineered cap. The cap would be engineered to meet RCRA Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements. The cap, combined with berms and ditches, would direct surface water around the perimeter of the cap and into the drainage ditch that flows into X-230J7 East Holding Pond. The anticipated volume of excavated material to be placed into the disposal cell is approximately 470,000 ft^3. This assumes selective removal of contaminated soil. If complete excavation of contaminated soil is chosen a much larger disposal cell would be needed or some combination of onsite and offsite disposal. This method would reduce further leaching of contaminants from the vadose zone by eliminating surface water infiltration.

Plant administrative controls would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding the type of soil contamination beneath the cap, requirements for appropriate personal protective equipment, requirements for proper disposal of any soil removed from the excavated area, and requirements for maintaining the cell and cap in its original condition.

Under the proposed action, the following corrective measures may be used individually or in combination to reach remediation goals at the X-701B Groundwater Contamination Area:

Oxidant Injection

Oxidant injection is the process of applying a chemical that will react with contaminants to render them innocuous. This technology may be used to treat the X-701B groundwater plume. One possible implementation scenario using this technology is the injection of dilute hydrogen peroxide in the western portion of the plume (west of Perimeter Road). Several groundwater extraction wells would be used to control the direction of groundwater flow.

Vacuum Enhanced Recovery

Vacuum enhanced recovery (VER) is the process of extracting total fluids, both liquids and vapors, from a control well. Groundwater is extracted with the purpose of lowering the water table, exposing more of the contaminated soil to air, thus expanding the vadose zone. Air movement can be accomplished much more effectively than water movement in the subsurface so cleanup can progress more rapidly. VER is applied to remove volatile organic compounds, which easily transfer from the water phase or adsorbed phase on soils to the vapor phase. VER wells may be used to extract vapor and groundwater in the central portion of the plume (east of Perimeter Road).

Steam Stripping/electrical resistance heating

Steam stripping is the process of heating contaminated soil and groundwater to vaporize volatile contaminants; thereby making extraction easier using standard vapor extraction techniques such as VER. The steam may be generated ex-situ and injected or steam can be generated in-situ using techniques such as the application of electrical voltage using electrodes to heat the water and/or contaminants to the boiling point. Subsurface vapor extraction wells would be used to remove steam and contaminant vapors as they are produced. A steam condenser would separate the mixture of soil vapors, steam, and contaminants extracted from the subsurface. This technique may be employed in areas where high concentrations of contaminants make other remediation measures less efficient.

Bioremediation

Bioremediation is the process of degrading a contaminant in an aerobic environment through a cometabolic process. Bacteria use the carbon associated with organic contaminants as a food source resulting in the breakdown of the organic contaminant into non-toxic constituents. Additional material can be added to enhance the existing food source to induce biodegradation in an aerobic environment. One of the possible applications of this technology may be an upgrade of an existing groundwater treatment facility. For example, the X-624 Groundwater Treatment Facility currently treats groundwater collected at the X-701B IRM Interceptor Trench. This facility may be demolished and replaced with a new building and treatment system to be located near the existing facility. The new treatment system would replace the current air stripper with an aerobic biological treatment unit, which would be supported by new injection and extraction wells. Current treatment media and chemicals would be reused at other treatment facilities or disposed of utilizing existing waste disposal procedures.

Phytoremediation

Trees would be planted in the eastern portion of the plume to promote phytoextraction of groundwater. Studies have shown that the root systems of the certain trees are capable of reaching depths significantly beyond the depth of the groundwater table in the vicinity of the X-701B Groundwater Plume Containment Trench, which is approximately 5 ft below land surface. The trees absorb trace minerals and contaminants from the soil and groundwater. A portion of the volatile organic compounds (VOCs) is metabolized within the tree and the remainder is transpired through the bark and leaves. The transpired TCE vapor is rapidly degraded in the atmosphere by ultraviolet light. The sugars and oxygen provided by the tree serve as nutrients for bacteria in the soil. The bacteria, promoted by the tree growth, aid in the in situ biodegradation of contaminants around the tree roots. By breaking down organic contaminants, bacteria obtain carbon and energy to help sustain bacterial reproduction processes.

Continue current groundwater treatment

Basement sumps in the X-705 Decontamination Building would continue to pump groundwater to the X-622T Groundwater Treatment or a replacement facility and the X-701B Interim Remedial Measures (IRM) trench would continue to extract contaminated groundwater and pump to the X-624 Groundwater Treatment Facility or its replacement for the next 30 years (based on model simulation). The X-622T and X-624 Groundwater Treatment Facilities currently treat portions of the Quadrant II groundwater plumes using carbon absorption and an air stripping system.

Replace existing groundwater treatment facilities with new treatment facilities

The X-622T and X-624 facilities may be replaced with new facilities and equipment to allow continued support for corrective measures. These replacements may be necessary because the existing facilities, constructed in 1991, have reached the end of their normally expected useful life. If it is to be replaced, X-622T, which is a trailer-mounted unit, will be demolished. X-622T would be replaced with a new building and treatment system located approximately near the existing facility. The replacement facility would be built with an increase in treatment capacity and may require the installation of an additional extraction well (8 in. to 10 in. diameter) installed in the area of the 7-Unit Groundwater Plume. Modifications may also need to be made to the X-624 facility to allow continued operation in the future due to the age of the existing equipment. Current treatment media and chemicals would be reused in the new facilities or disposed of utilizing existing waste disposal procedures.

ALTERNATIVES: Because a range of alternative corrective measures was evaluated under the proposed action, the only alternate action considered to the proposed action was the no action alternative. Under the no action alternative, no treatment, containment, removal, or monitoring of the environmental media would be performed beyond what is currently being performed in Quadrant II. Access restrictions to PORTS in its current condition would continue at its present level. Although contaminant toxicity, mobility, and total volume may still be reduced through the natural processes of attenuation (i.e., dispersion, dilution, and adsorption), the time to reach acceptable levels would be extremely long (> 30 years). No monitoring effort would be included in this alternative beyond current levels. DOE would not be able to comply with its obligations under the Administrative Consent Order (ACO) agreement with the U.S. EPA and Ohio EPA. The no action alternative would allow short-term exposure risks to on-site workers to continue at present levels. The long-term exposure risk associated with this alternative may increase if either access restrictions or the present level of contaminant controls and monitoring were terminated in the future. Activities associated with site cessation, such as development of land use controls, may require additional NEPA review.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION: The impacts of the proposed action and alternatives were analyzed in the EA. All components of the proposed action were reviewed and appropriate consultations with agencies concerned with protection of wildlife, threatened and endangered species, and cultural and historic resources were notified of the proposed action (Implementation of corrective measures at Quadrant II at the Portsmouth Gaseous Diffusion Plant). Through the application of best management practices and with the implementation of appropriate mitigation measures, potential adverse environmental impacts to soils, water resources, and ecological resources would be expected to be minimal.

The FONSI for the proposed action is based on the following factors which are supported by information and analyses in the EA.

AIR QUALITY

Local ambient air quality should be minimally affected by emissions from vehicle and equipment exhaust, fugitive dust from vehicle traffic, and disturbance of soils during construction. Off-gas treatment systems may be required for the VER/Steam Stripping/electrical resistance heating corrective measures but emissions from the treatment systems should be minimal. The demolition/replacement of existing facilities could also have a minor temporary effect. The extent of dust generation would depend on the level of construction activity and on soil composition and dryness, and the degree of dust suppression techniques employed. Air permits-to-install would be submitted to the Ohio Environmental Protection Agency for construction activities and the operation of the treatment equipment. These activities would not be expected to result in a noncompliance of air quality standards, have an adverse impact on air quality, or be detrimental to human health.

GEOLOGY AND SOILS

The activities associated with the proposed action would take place in areas previously disturbed by industrial development.

WATER RESOURCES

Spills of fuel, hazardous material, waste, or a sewer line leak could have adverse impacts on surface waters if not controlled or contained. Impacts would primarily be a change to the water quality, which could affect vegetation and aquatic biota. Soil impacts would be mitigated through the use of best management practices. Dikes also would be installed to mitigate any environmental damage that could result from spillage.

FLOODPLAINS AND WETLANDS

Floodplains, streams, and wetland areas would be avoided to the extent practicable, and there would be no disturbance of sediment or sensitive habitats.

ECOLOGICAL RESOURCES

No threatened and/or endangered species are known to be present within any areas proposed for the implementation of the Quadrant II corrective measures.

CULTURAL RESOURCES

The proposed action has been reviewed in accordance with Section 106 of the National Historic Preservation Act and 36 *Code of Federal Regulations* 800. On December 5, 2001, a letter of notification was transmitted to the Ohio State Historic Preservation Officer (SHPO) with a DOE determination that there would be no adverse effects on historical resources included or eligible for inclusion on the National Register of Historic Places; and on January 30, 2002, a letter was received from the Ohio SHPO concurring with this determination. Copies of these letters are included in Appendix A of the EA.

SOCIOECONOMICS

Socioeconomic impacts associated with the Quadrant II corrective measures implementation would have a minor impact on transportation; however, no other socioeconomic impacts, including Environmental Justice concerns, would result from this proposed action. Based on the absence of minority tracts relative to PORTS, disproportionate impacts to minority populations would not occur. Although many low-income populations are located in Pike County, no disproportionately high and adverse human health or environmental impacts to these populations are expected.

INFRASTRUCTURE AND SUPPORT SERVICES (Transportation and Utilities)

Transportation impacts associated with the proposed action would be minimal. Impacts to transportation in the area would not require modification of roads or other infrastructure to accommodate additional traffic.

NOISE

Noise impacts would be minimal from this proposed action. No sensitive noise receptor sites (e.g., picnic areas, playgrounds, churches) are located within or near PORTS.

HUMAN HEALTH AND SAFETY

No unique occupational health and safety hazards would be posed by the proposed action. Falls, spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation could occur, and similar hazards also would be present during construction activities. On-site occupational radiological exposures for subcontractors implementing any actions discussed in the EA would be similar to the doses estimated for on-site workers and would be kept below the 5000 mrem/yr limit for occupational exposures of radiation workers set by the NRC and DOE.

ACCIDENTS

Accidents could occur during construction activities or operation of a new or existing facility or from operator error, equipment malfunction, or from natural phenomena. Transportation accidents also could occur but would be expected to be similar to those that could occur during normal operations at PORTS. The use of safety procedures, spill prevention plans, and spill response plans in accordance with state and federal laws would minimize the severity of potential impacts from accidents.

WASTE MANAGEMENT AND WASTE MINIMIZATION

It is anticipated that a varying amount of solid waste, decontamination/groundwater solutions and construction debris would be generated as part of any of the alternatives evaluated in the EA. Regardless of the alternative(s) selected, waste generation, handling and disposal, including any pollution prevention and waste minimization practices, would be accomplished in accordance with established procedures and regulations.

CUMULATIVE IMPACTS

The proposed action would have minimal cumulative impacts on local or regional air quality, surface water and groundwater resources, existing habitats and biota, socioeconomics, transportation, and public and occupational health. Cumulative impacts would be expected to be equal to or less than those that currently exist in and around PORTS.

Potential cumulative impacts that could occur from the proposed action to implement corrective measures in Quadrant II at PORTS were discussed in the EA. Detailed environmental impact analysis of many of the actions is beyond the scope of the EA and would be subject to separate NEPA review.

DETERMINATION: Based on the analyses of the EA, DOE has determined that the proposed action to implement corrective measures in Quadrant II at the Portsmouth Gaseous Diffusion Plant does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969. Therefore, an Environmental Impact Statement on the proposed action is not required.

Issued in Oak Ridge, Tennessee, this 24 day of February 2003.

Gerald G. Boyd
Manager
U.S. Department of Energy
Oak Ridge Operations
Oak Ridge, Tennessee

DOE/EA-1459

Environmental Assessment
Quadrant II Corrective Measures Implementation
at the
Portsmouth Gaseous Diffusion Plant,
Piketon, Ohio

This document has received the appropriate reviews for release to the public

Released for
Public Review

Pro2Serve® Technical Solutions

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

DOE/EA-1459

ENVIRONMENTAL ASSESSMENT

QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT PIKETON, OHIO

Date Issued —-January 2003

Prepared by
Pro2Serve Technical Solutions
Piketon, Ohio
under subcontract 23900-BA-ES144

Prepared for the
BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
East Tennessee Technology Park
Y-12 National Security Complex Oak Ridge National Laboratory
Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant
under contract DE-AC05-98OR22700
for the
U.S. DEPARTMENT OF ENERGY

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FIGURES

TABLES

ACRONYMS

ACO	Administrative Consent Order
Am	americium
AMSL	above mean sea level
ARAR	applicable or relevant and appropriate requirements
bgs	below ground surface
BJC	Bechtel Jacobs Company LLC
BMP	best management practice
CAA	Clean Air Act of 1970
CAS/CMS	Cleanup Alternatives Study/Corrective Measures Study
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
Ci	curie
CMI	Corrective Measures Implementation
COC	contaminants of concern
CWA	Clean Water Act of 1972
CX	Categorical Exclusion
D&D	decontamination and decommissioning
DFF&Os	Director's Final Findings and Orders
DOE	U.S. Department of Energy
EA	environmental assessment
EDE	effective dose equivalent
EPA	Environmental Protection Agency
ERH	Electrical Resistance Heating
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FY	fiscal year
gal	gallon
GCEP	Gas Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
ha	hectare
HEU	highly enriched uranium
HF	hydrogen fluoride
IGWMP	Integrated Groundwater Monitoring Plan
km/h	kilometers per hour
L/d	liters per day
MGD	million gallons per day
mph	miles per hour
mrem	millirem
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
Np	neptunium

NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRCE	National Register Criteria for Evaluation
NRHP	National Register of Historic Places
ODNR	Ohio Department of Natural Resources
ODOD	Ohio Department of Development
ORO	Oak Ridge Operations
OSHA	Occupational Safety and Health Act of 1970
OVEC	Ohio Valley Electric Corporation
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PGDP	Paducah Gaseous Diffusion Plant
PORTS	Portsmouth Gaseous Diffusion Plant
PPE	personal protective equipment
PRG	preliminary remediation goal
PSD	prevention of significant deterioration
psi	pounds per square inch
Pu	plutonium
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act of 1976
RCW	recirculating cooling water
RFI	RCRA Feasibility Investigation
RHW	recirculating heating water
ROD	Record of Decision
ROI	region of influence
ROW	right-of-way
SAR	Safety Analysis Report
SHPO	State Historic Preservation Officer
SODI	Southern Ohio Diversification Initiative
SOMC	Southern Ohio Medical Center
STP	sewage treatment plant
SWMU	Solid Waste Management Unit
Tc	technetium
TCA	trichloroethane
TCE	trichloroethene
TEVE	Thermally Enhanced Vapor Extraction
Th	thorium
TSCA	Toxic Substances Control Act of 1976
U	uranium
USACE	U.S. Army Corps of Engineers
U.S. EPA	U.S. Environmental Protection Agency
UF_6	uranium hexafluoride
USEC	United States Enrichment Corporation
USFWS	U.S. Fish and Wildlife Service
VER	Vacuum Enhanced Recovery
VOC	volatile organic compound
WWH	Warmwater Habitat

1. INTRODUCTION

1.1 PURPOSE AND NEED FOR U.S. DEPARTMENT OF ENERGY ACTION

The proposed action evaluated in this Environmental Assessment (EA) is to implement environmental corrective measures in Quadrant II of the U.S. Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant (PORTS) located in Piketon, Ohio. The environmental corrective measures are necessary to comply with the DOE signed agreements with the U.S. Environmental Protection Agency (EPA) and the Ohio Environmental Protection Agency (Ohio EPA) that require DOE to conduct Resource Conservation and Recovery Act (RCRA) corrective measures at PORTS near Piketon, Ohio.

Both U.S. EPA and Ohio EPA agreed during a December 12, 1994, Decision Team meeting that a site-wide program plan would be developed to provide a general framework for controlling and implementing corrective action alternatives at PORTS. The program plan would then be supplemented by a Solid Waste Management Unit (SWMU) specific Corrective Measures Implementation (CMI) program plan for each corrective action. The plant was divided into four quadrants (based generally on groundwater flow directions) to help focus and time-phase these efforts.

The environmental restoration program at PORTS is the subject of two compliance agreements. The State of Ohio and DOE filed a Consent Decree on September 1, 1989, and the U.S. EPA Region V and DOE entered into an Administrative Consent Order (ACO) on September 27, 1989, for the performance of response action/corrective actions at PORTS. An amendment to that order was issued in August, 1994. On August 12, 1997, the DOE, Ohio EPA, and U.S. EPA entered into an Administrative Consent Order for the purpose of defining oversight roles for Ohio EPA and U.S. EPA and certain performance obligations for DOE, which replaced the earlier version of the ACO, as amended. Pursuant to this Administrative Consent Order, Ohio EPA assumed the lead oversight role from U.S. EPA for all remedial and corrective action activities at PORTS. Among various deliverables, the Ohio Consent Decree requires a Cleanup Alternatives Study (CAS) and the U.S. EPA Administrative Consent Order requires a Corrective Measures Study (CMS). The Ohio EPA and U.S. EPA have agreed to a single document, a CAS/CMS report, to fulfill the requirements for these essentially equivalent deliverables.

The Quadrant II CAS/CMS (DOE 2001e) report issued on February 28, 2001, and two addenda, one issued on December 4, 2001 (DOE 2001f) and the other issued June 25, 2002 (DOE 2002), which are incorporated herein by this reference, are available for public review at the DOE Information Center located at 3930 U.S. 23, Piketon, Ohio with the point of contact being Janie Croswait. After review of the potential alternative corrective measures, Ohio EPA will issue a Quadrant II Decision Document identifying the preferred alternative(s). This Decision Document has not been issued at this time. As a result, a bounding analysis was performed which covers all of the corrective measures scenarios discussed in the CAS/CMS. If corrective measures are selected for Quadrant II that are outside of the scope of this bounding analysis, additional NEPA evaluation may be required. A copy of the Executive Summary from the Quadrant II CAS/CMS is included in Appendix E.

The Quadrant II CMI Program Plan will include specific activities outlined in the Quadrant II Decision Document. A schedule for accomplishing the construction tasks will also be included. This SWMU specific plan, along with the generic CMI Program Plan, will summarize the activities to be conducted to ensure compliance with federal, state, and local regulations, and applicable or relevant and appropriate requirements (ARARs) which will be outlined in the Decision Document. The Ohio EPA is expected to issue the Decision Document in 2003.

1.2 BACKGROUND

PORTS is one of only two federally owned, privately operated uranium enrichment facilities in the United States. The uranium enrichment production and operations facilities at the site are owned by DOE and leased to the United States Enrichment Corporation (USEC). DOE's management and integration contractor, Bechtel Jacobs Company LLC (BJC), is responsible for environmental restoration, waste management, and operation of non-leased facilities (facilities not leased to USEC) (DOE 1999a). Martin Marietta Energy Systems, Inc., and its successor company Lockheed Martin Energy Systems, Inc., was the management contractor for DOE from November 1986 through March 1998. On April 1, 1998, BJC assumed responsibility for environmental restoration, waste management, and operation of non-leased facilities (facilities that are not leased to USEC) at PORTS as the environmental management contractor for DOE. PORTS is located in a rural area of Pike County in south central Ohio, on a 9.3-km^2 (5.8-$mile^2$) site (Figs. 1.1 and 1.2). The nearest residential center in this area is Piketon, which is about 8.1 km (5 miles) north of the plant on U.S. Route 23. The county's largest community, Waverly, is about 16.1 km (10 miles) north of the plant. Additional population centers within 80.5 km (50 miles) of the plant are Portsmouth, 43.5 km (27 miles) south; Chillicothe, 43.5 km (27 miles) north; and Jackson, 41.9 km (26 miles) east.

1.3 PORTS HISTORY

PORTS has been in operation since 1956 as an active uranium enrichment facility supplying enriched uranium for government and commercial use. Initially, PORTS was needed to provide U^{-235} at assays above those of the other production facilities at Oak Ridge, Tennessee, and Paducah, Kentucky for research and military applications including material to be used in the fabrication of fuel for nuclear powered U.S. Navy vessels. In the late 1970s, PORTS was chosen as the site for a new enrichment facility using gas centrifuge technology. Construction of the Gas Centrifuge Enrichment Plant (GCEP) began in 1979 but was halted in 1985 because the demand for enriched uranium decreased.

In 1991, DOE suspended production of highly enriched uranium (HEU) for the U.S. Navy at PORTS. The plant continued to produce only low-enriched uranium for use by commercial nuclear power plants until May of 2001 (DOE 1999a; ORNL 1999).

In accordance with the Energy Policy Act of 1992, USEC, a newly created government corporation, assumed full responsibility for uranium enrichment operations at PORTS on July 1, 1993. DOE retains certain responsibilities for decontamination and decommissioning (D&D), waste management, depleted UF_6 cylinders, and environmental remediation. USEC subsequently became a publicly held private corporation on July 28, 1998 (DOE 1999a; ORNL 1999).

1.3.1 Uranium Enrichment Activities at PORTS

The uranium enrichment production and operations facilities at PORTS are leased to USEC and are located on approximately 259 hectares (ha) (640 acres) within the 1503-ha (3714-acre) DOE reservation. In addition to the three gaseous diffusion process buildings, extensive support facilities were required to maintain the diffusion process. The support facilities include administration buildings, a steam plant, electrical switchyards, cooling towers, cleaning and decontamination facilities, water and wastewater treatment plants, fire and security headquarters, maintenance, warehouse, and laboratory facilities.

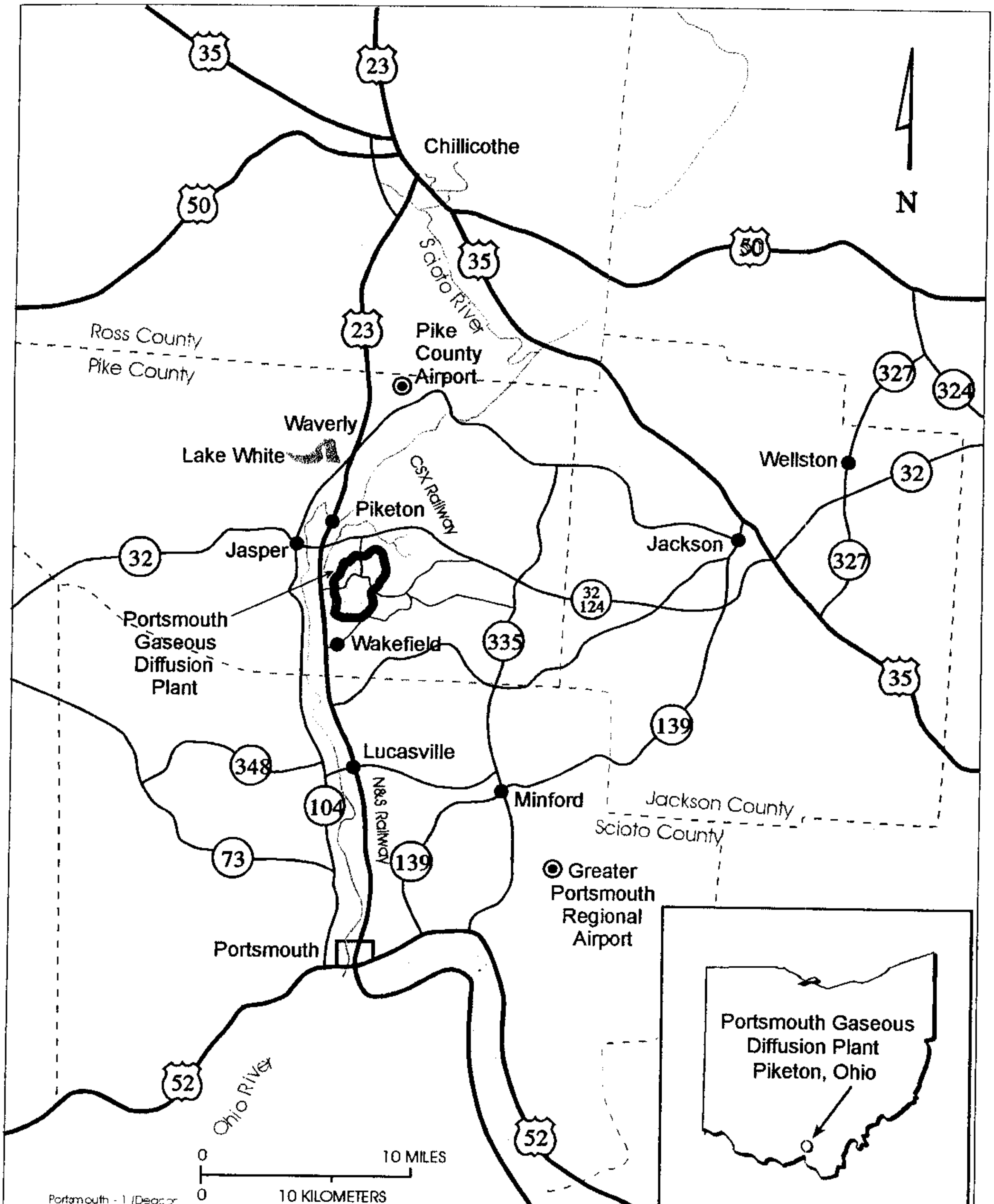

Fig. 1.1. Location of PORTS in relation to the geographic region.

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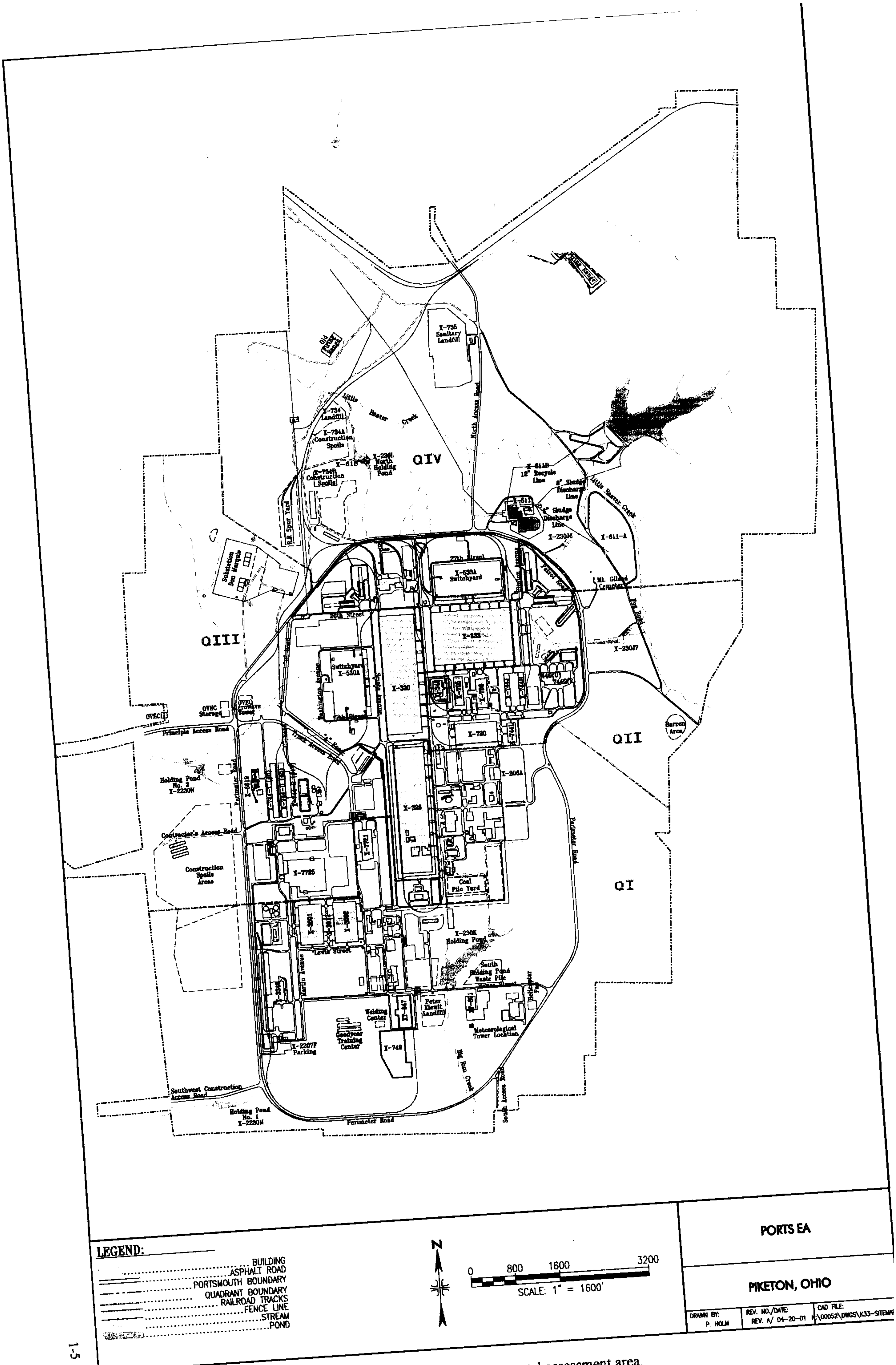

Fig. 1.2 PORTS environmental assessment area.

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On June 21, 2000, USEC announced that it would cease uranium enrichment operations at PORTS starting in June 2001 (USEC 2000). Since USEC's announcement, DOE proposed placing the GDP in cold standby (see Sect. 4.14.1 for a definition of cold standby). This was approved and the uranium enrichment process equipment was shutdown and placed in cold standby in May 2001. It is anticipated that USEC will continue to operate its transfer and shipping facilities at PORTS until September 2003 after the cessation of enrichment operations.

1.3.2 Environmental Restoration at PORTS

The DOE-PORTS Environmental Restoration Program was developed in 1989. Site cleanup is managed in accordance with RCRA, amended in 1984 by the Hazardous and Solid Waste Amendments. Other applicable laws include the CERCLA of 1980, amended in 1986; Toxic Substances Control Act of 1976 (TSCA); Clean Water Act of 1972 (CWA); and Clean Air Act of 1970 (CAA). Oversight of cleanup activities at PORTS is conducted by the Ohio EPA and U.S. EPA under the directive of a Consent Decree between the State of Ohio and DOE, issued on August 29, 1989, and an ACO between DOE, Ohio EPA, and the U.S. EPA, issued on September 17, 1989 (amended in 1994 and 1997) (DOE 1999a). The site is divided into quadrants based on groundwater flow patterns to facilitate the investigation and cleanup.

In 1998, DOE submitted a CAS/CMS for two of the quadrants. The Ohio EPA and U.S. EPA approved the CAS/CMS for Quadrant III on July 13, 1998, and Quadrant IV on October 18, 1998. The Quadrant I CAS/CMS was submitted to Ohio EPA and U.S. EPA and was approved on June 12, 2000. The Quadrant II CAS/CMS (DOE 2001e) was submitted on February 28, 2001. On August 31, 2001, Ohio EPA notified DOE that some additional alternatives for soil remediation needed to be investigated. An addendum to the Quadrant II CAS/CMS (DOE 2001f) addressing these additional alternatives for soil remediation was submitted to Ohio EPA on December 4, 2001.

1.3.3 Waste and Materials Management at PORTS

DOE-PORTS, through its Waste Management Program, oversees the management of waste generated from DOE operations and from environmental restoration projects. Under the USEC lease agreement, USEC pays DOE for storage of certain wastes such as waste contaminated with radioactivity generated by plant operations. However, USEC is responsible for waste treatment and disposal of wastes generated from their operations. Waste management requirements are varied and often complex because of the variety of wastes generated by DOE-PORTS activities, including radioactive, hazardous (chemical), polychlorinated biphenyls (PCBs), asbestos, industrial, and mixed (radioactive and hazardous) wastes. All DOE waste management activities are conducted in compliance with state and federal regulations. Supplemental policies also have been implemented for waste management. They include:

- minimizing waste generation;
- characterizing and certifying wastes before they are stored, processed, treated, or disposed;
- pursuing volume reduction and use of on-site storage (when safe and cost effective) until a final treatment and/or disposal option is identified; and
- recycling.

1.3.4 Reindustrialization Program

Several ongoing initiatives are underway at PORTS in coordination with the Southern Ohio Diversification Initiative (SODI), the recognized community reuse organization for PORTS. DOE's Office of Worker and Community Transition established community reuse organizations to minimize the negative effects of workforce restructuring at DOE facilities that have played an historic role in the nation's defense. These organizations provide assistance to the neighboring communities negatively affected by changes at these sites. Currently, an EA is being developed for the Reindustrialization Program at PORTS, DRAFT DOE/EA-1346, *Environmental Assessment, Reindustrialization Program at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*. This EA is for a proposed action to transfer real property (i.e., underutilized, surplus, or excess PORTS land and facilities) by lease and/or sale (i.e., donation, transfer to another federal agency, or exchange) via a reindustrialization program. This action is currently on hold.

1.4 SCOPE OF THIS EA

DOE has prepared this EA to present the public with information on the potential impacts associated with the implementation of corrective measures, including additional investigative and monitoring actions, as necessary, to contain and remove environmental contamination at the X-701B Holding Pond and Retention Basins and X-701B Area Groundwater, and reasonable alternatives, as well as to ensure that potential environmental impacts are considered in the decision-making process. DOE is required to assess the potential consequences of its activities on the human environment in accordance with the Council on Environmental Quality (CEQ) regulations (40 *CFR* Parts 1500–1508) implementing National Environmental Policy Act (NEPA) and DOE NEPA Implementing Procedures (10 *CFR* 1021). If the impacts associated with the proposed action are not determined to significantly affect the quality of the human environment as described in this EA, DOE would issue a Finding of No Significant Impact (FONSI). If the impacts are identified as significant, an Environmental Impact Statement may be prepared.

Because the preferred corrective measure actions have not been identified by Ohio EPA and U.S. EPA at this time, all of the reasonably foreseeable corrective measures options as identified in the Quadrant II CAS/CMS and their associated environmental effects are addressed.

This EA (1) describes the existing environment at PORTS relevant to potential impacts of the proposed action and alternatives; (2) analyzes potential environmental impacts; (3) identifies and characterizes cumulative impacts that could result at PORTS in relation to other ongoing or proposed activities within the surrounding area; and (4) provides DOE with environmental information for use in prescribing restrictions to protect, preserve, and enhance the human environment and natural ecosystems.

2. DESCRIPTION OF ALTERNATIVES

2.1 PROPOSED ACTION

DOE proposes to implement corrective measures in Quadrant II at the PORTS. The environmental corrective measures are necessary to comply with the U.S. DOE signed compliance agreements with the U.S. EPA and the Ohio EPA that require DOE to conduct RCRA corrective measures at PORTS to remediate soil and groundwater in portions of Quadrant II, which are contaminated at levels exceeding acceptable risk criteria. A system was developed to evaluate Solid Waste Management Units (SWMU) in Quadrant II considered a source or potential source of contamination. Each SWMU was categorized on the basis of current and realistic future risk as determined by analyzing data from the RCRA Facility Investigation (RFI) Baseline Risk Assessment. The units were placed in categories of SWMUs requiring no further action, SWMUs deferred to decontamination & decommissioning, and SWMUs requiring remedial action alternatives developed in a Corrective Action Study/Corrective Measures Study (CAS/CMS). A detailed description of these units and their disposition can be found in the Quadrant II CAS/CMS Final Report [Chapter 2].

SWMUs in Quadrant II, which were determined to require no further action include the X-343 Feed Vaporization and Sampling Facility, the X-700CT Chemical and Petroleum Containment Tanks, X-700T TCE/TCA Outside Storage Tank (soils only), X-701BP Northeast Oil Biodegradation Plot, the X-744RW Retrievable Waste Storage Area, the X-747G Northeast Contaminated Material Storage Yard also known as the X-747G Precious Metal Scrap Yard (soils only), the Barren Area, and Process Waste Line Soils (X-700 and X-705).

Due to the continued need to maintain the facilities integral to the operation of the Gaseous Diffusion Plant (GDP) in the cold standby mode and the fact that there is no immediate threat to human health or the environment as determined in the RCRA Facility Investigation (RFI) Baseline Risk Assessment, development of remedial action alternatives at several SWMUs is being deferred. The deferred SWMUs in Quadrant II include: the X-633 Recirculating Water Pump House and Cooling Towers, the X-700 Chemical Cleaning Facility (soils only), soils in the vicinity of the X-720 Neutralization Pit, X-705 Decontamination Building (soils only), X-705A Radioactive Waste Incinerator/X-705B Contaminated Burnables Storage Lot (soils only), the X-720 Maintenance Building (soils only), the X-744Y Waste Storage Yard, the X-744G Bulk Storage Building (soils only), the X-701C Neutralization Pit, the East Drainage Ditch, the X-230J7 East Holding Pond and Oil Separation Basin, and Little Beaver Creek. Additional investigative and monitoring actions may be necessary as corrective measures studies begin at these units and the need for additional information is identified.

The X-701C Neutralization Pit and soils in the area of the X-720 Neutralization Pit were identified as potential source areas, and actions in these areas have been taken to mitigate the potential spread of contamination in these areas. The X-701C Neutraliztion Pit has been removed and limited soil removal has been employed south of the former X-720 Neutralization Pit to eliminate inorganic contaminants exceeding soil PRGs. The excavation was then backfilled and concrete cover placed over the area. The substantive requirements of RCRA have been met for soils at the X-744Y Waste Storage Yard leaving the groundwater plume associated with this unit to be addressed along with the X-701B Groundwater Plume.

Because both soil and groundwater were contaminated at levels exceeding acceptable risk, remedial action alternatives were determined to be required at two SWMUs. These areas are the X-701B Holding Pond and Retention Basins Area and the X-701B Groundwater Plume Area. A wide range of corrective measures technologies and methods were evaluated as part of the Quadrant II CAS/CMS. These ranged from institutional controls to removal of all contaminated soil, subsurface piping systems installation, and installation of an engineered cap for the X-701B Holding Pond and Retention Basins. For the X-701B Groundwater Plume Area the potential corrective measures ranged from institutional controls to various combinations of ex-situ and in-situ treatment including bio- and phyto- remediation and steam stripping with vapor extraction.

Details regarding the range of corrective action alternatives for Quadrant II may be found in the Quadrant II CAS/CMS [Chapters 6 and 7] and the Addendum to Quadrant II CAS/CMS [Chapter 2].

2.1.1 X-701B Holding Pond and Retention Basins Area - Range of Potential Corrective Measures

Remedial activities are planned for the X-701B Holding Pond and Retention Basins (Fig. 2.1) because they are potential sources of continuing groundwater contamination. The X-701B Holding Pond was an unlined, 200 ft by 50 ft pond used for the neutralization and settling of metal-bearing wastewater which included uranium and other radionuclides, solvent-contaminated solutions and acidic wastewater. The X-701B Holding Pond was in use from 1954 until November 1988 and was regulated as NPDES outfall 001A between August 1983 and September 1991. Most of the waste discharged to the pond originated at the X-700 Chemical Cleaning Facility and the X-705 Decontamination Building. From 1974 until 1988, slaked lime was added to the X-701B influent at the X-701E Neutralization Facility to neutralize the low pH and induce precipitation of dissolved metals including uranium. This precipitation caused large amounts of sludge to accumulate in the pond and necessitated periodic dredging of the sludge. The sludge recovered during dredging activities was stored in two retention basins located northwest of X-701B.

The X-701B East and West Retention Basins were unlined sludge retention basins used for the settling, dewatering and storage of sludge removed from the X-701B Holding Pond. The East Retention Basin, built in 1973, was approximately 220 ft by 65 ft (narrowing to 25 ft wide in the northeast corner) and was 3.5 ft deep. The East Retention Basin was in use from 1973 until approximately 1980. The West Retention Basin was built in 1980, when the East Retention Basin reached capacity. The West Retention Basin was approximately 220 ft by 45 ft (narrowing to 35 ft wide in the northern portion) and was 3 ft deep. The West Retention Basin was in use from 1980 until 1988.

In 1989, PORTS initiated a two-phase closure of the unit. As part of the first phase, sludge was excavated from the holding pond and two retention basins. The sludge was dewatered, placed in containers and transported to on-site storage. The retention basins were backfilled, graded, and seeded. The second phase began in 1994, and included construction of a groundwater pump-and-treat system and in-situ treatment of soils in the bottom of the holding pond with thermally enhanced vapor extraction (TEVE). Limestone riprap and gravel were placed on the bottom of the holding pond to support the soil treatment equipment. Use of TEVE was terminated after it failed to achieve identified performance standards. However, the limestone riprap and gravel material remains in the holding pond, and a gravel access road remains on the southeast side of the holding pond. Two pumps in a sump located in the low point of the holding pond, which have the ability to dewater the pond, remain operational. The water removed by these two pumps is transferred, via underground piping, directly into the X-623 Groundwater Treatment Facility.

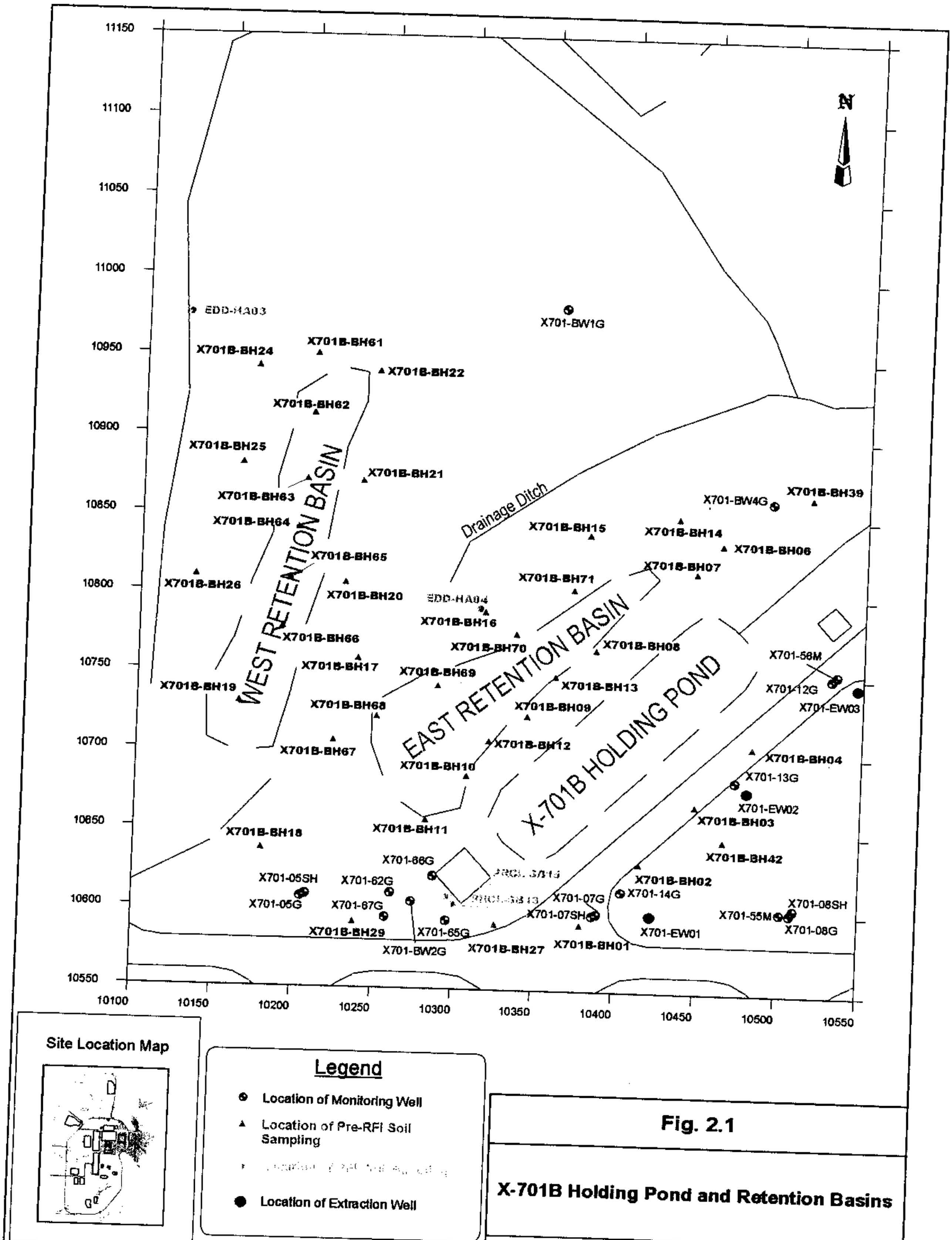

Fig. 2.1

X-701B Holding Pond and Retention Basins

DOCUMENT ID: QII EA DOE/EA- 1459	DRAWING ID: Fig 2.1 Q2EA X-701B Pond.cdr	DRAWING DATE: September 21, 2001 BA

During 1997 and 1998, an investigation in the X-701B Retention Basin area revealed that the saturated fill material in the retention basins was contaminated with uranium and technetium at concentrations that exceeded preliminary remediation goals (PRG). In addition, detectable concentrations of transuranics were discovered. An evaluation of surface and subsurface radionuclide data in this area indicate there is no correlation between the sporadic detections of surface contamination and contamination found in the saturated fill material. Therefore, the higher radionuclide concentrations found in the fill material are believed to be the result of incomplete removal of sludge during initial closure actions at the retention basins. Existing data does not indicate that radioactive contaminants are migrating from the retention basins to either surface water or groundwater at concentrations exceeding PRGs.

Only groundwater samples were collected in this X-701B Retention Basin Area during the RCRA Feasibility Investigation (RFI). Therefore, no assessments were performed to evaluate the risk of exposure to contaminants in soils. The X-701B Holding Pond and Retention Basins were integrated into the CAS/CMS process in the Director's Final Findings and Orders (DFF&Os) journalized on March 24, 1999.

Several potentially viable corrective measures alternatives were identified and considered for soil remediation at this SWMU. These alternatives have been evaluated for effectiveness, ease of implementation, and cost. All alternatives were evaluated for their abilities to meet PRGs, address all environmental problems, reduce overall risks, and protect human health and the environment. PRGs for the SWMU are listed in Table 2.1. Any one or a combination of these alternatives may be selected for implementation.

Table 2.1 Soil PRGs for the X-701B Holding Pond and Retention Basins

Contaminants of Concern	PRG (mg/kg)
Americium-241	7.9 pCi/g
Arsenic	10
Beryllium	1.4
Nickel	34
Plutonium-239/240	9.9 pCi/g
Technetium	11,400 pCi/kg
Uranium	7.4
2-Butanone (MEK)	1.8
Benzene	0.015
Cis-1,2-Dichloroethene	0.12
Tetrachloroethene	0.27
Toluene	7.7
Trichloroethene (TCE)	0.048
Vinyl Chloride	0.012

mg/kg = milligram per kilogram
pCi/kg = picocuries per kilogram
pCi/g = picouries per gram

2.1.1.1 Institutional controls

These alternatives describe land deed restrictions that limit residential and commercial land development and access controls to prevent exposure to contaminated soils. There are no remedial actions being conducted. Once the on-site presence of DOE/USEC has ceased, it may be difficult to control future activities and, therefore, there is an increased risk of potentially exposing future site personnel or the public. Activities associated with site cessation, such as development of land use controls, may require additional NEPA review.

2.1.1.2 Minor soil removal

This alternative involves the excavation of the X-701B Holding Pond and Retention Basins and then backfilling with clay material. The total amount of contaminated soil to be removed is estimated to be in the range of 81,000 ft^3 to 110,000 ft^3. Plant administrative control would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding requirements for appropriate personal protective equipment and requirements for proper disposal of any soil removed from the excavated area. Waste generated under this corrective measure would be primarily Low Level Radioactive and would require disposal at an authorized off-site treatment storage and disposal facility or an on-site disposal cell.

2.1.1.3 Minor selective removal, and capping

The X-701B Holding Pond and Retention Basins would be backfilled with clay to build up the existing topography in support of subsequent capping layers. The total amount of contaminated soil to be removed outside the capped area is estimated to be 270 ft^3 to 40,000 ft^3. The caps will be engineered to meet RCRA Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements. The cap, combined with berms and ditches, would reduce water infiltration through the contaminated soil area and direct surface water around the perimeter of the cap and into the drainage ditch that flows into X-230J7 East Holding Pond.

Plant administrative control would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding the type of soil contamination beneath the cap, requirements for appropriate personal protective equipment, requirements for proper disposal of any soil removed from the excavated area, and requirements for maintaining the cap in its original condition.

2.1.1.4 Extensive soil removal

The X-701B Holding Pond and Retention Basins would be excavated to remove soil contaminants. The excavation would then be partially backfilled with clay and graded to drain into the existing drainage system. The X-701E Neutralization Building and several existing monitoring, injection and extraction wells in the area as well as the X-747G Precious Metal Scrap Yard may require relocation/demolition depending on the extent of excavation. The relocation/demolition of the X-747G yard, if necessary, would also require the disposal or relocation of the material currently stored in and around the yard as well as some adjacent structures and power poles. The total amount of contaminated material to be excavated under this scenario could range from 40,000 ft^3 (selective removal) to over 2,100,000 ft^3 (complete removal). As much as 80,000 ft^3 of the excavated material (primarily soil below the water table) is expected to be mixed (RCRA hazardous and Low Level Radioactive). The rest is expected to be Low Level Radioactive. Waste generated as a result of these actions will be disposed of at a treatment, storage and disposal facility licensed to handle this type of material.

Plant administrative controls would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding requirements for appropriate personal protective equipment and requirements for proper disposal of any soil removed from the excavated area.

2.1.1.5 Removal of piping system

The X-701B Holding Pond's existing pump and associated piping located within the holding pond and surrounding areas would be removed.

2.1.1.6 Construction of disposal cell with leachate collection

The X-701B Holding Pond and Retention Basins would be excavated, including the removal of the existing pump and associated piping located within the holding pond and surrounding areas. The excavated material would be temporarily staged on-site and the resulting depression would be converted into an engineered disposal cell with an underlying liner system (including leachate collection) and engineered cap. The cap would be engineered to meet RCRA Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements. The cap, combined with berms and ditches, would direct surface water around the perimeter of the cap and into the drainage ditch that flows into X-230J7 East Holding Pond. The anticipated volume of excavated material to be placed into the disposal cell is approximately 470,000 ft^3. This assumes selective removal of contaminated soil. If complete excavation of contaminated soil is chosen a much larger disposal cell would be needed or some combination of onsite and offsite disposal. This method would reduce further leaching of contaminants from the vadose zone by eliminating surface water infiltration.

Plant administrative controls would be implemented by requiring excavation permits before starting excavation activities. These permits would include information regarding the type of soil contamination beneath the cap, requirements for appropriate personal protective equipment, requirements for proper disposal of any soil removed from the excavated area, and requirements for maintaining the cell and cap in its original condition.

2.1.2 X-701B Groundwater Area - Range of Potential Corrective Measures

Two plumes collectively comprise the Quadrant II Groundwater Investigative Area: the 7-Unit Groundwater Area plume and the X-701B Groundwater Area plume. Development of alternatives is limited to the X-701B Groundwater Area plume because remediation of the 7-Unit Groundwater Area plume cannot be completed at this time due to its location within the current industrial area (Fig. 2.2). Existing data are sufficient to support the development of groundwater remedial alternatives. The groundwater plume at the X-744Y Waste Storage Yard will be addressed as part of the X-701B plume. Additional monitoring wells may be installed during the design phase. Arsenic, barium, beryllium, copper, 2-butanone, bromodichloromethane, toluene, neptunium, radium, and thorium in the Gallia and all constituents listed as contaminants of concern (COC) in the Berea, except 1,1,2-trichloroethane, were each detected above PRGs at one location in a single sample. As such, these contaminants do not appear to present a risk to potential receptors due to their limited vertical and areal extent. TCE has been selected as the primary COC for groundwater in the X-701B Groundwater Area because of its widespread occurrence. Tables 2.2 and 2.3 present the COCs and their PRGs for Gallia and Berea groundwater, respectively.

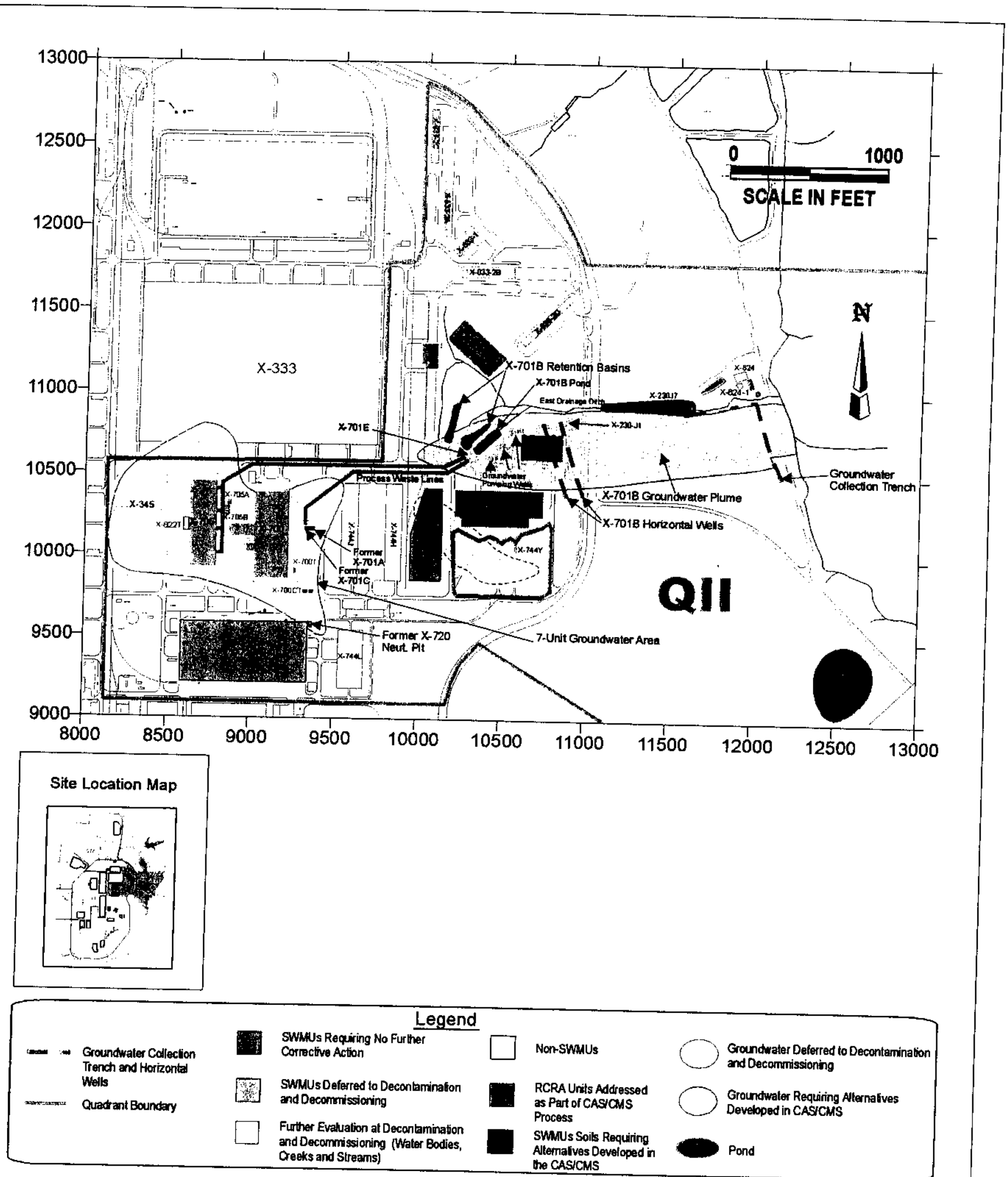

Fig. 2.2

Disposition of SWMUs in Quadrant II

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Table 2.2. Gallia Groundwater COCs
X-701B Groundwater Area

Contaminants of Concern	Gallia Groundwater PRG (µg/L)
Arsenic *	92
Barium *	2000
Beryllium *	6.5
Cadmium	6.5
Chromium	100
Copper *	21
Lead	50
Manganese	14300
Nickel	100
Silver	4750
Thallium	10.5
Bis(2-ethylhexyl)phthalate	6
1,1,1-Trichloroethane	200
1,1,2,2-Tetrachloroethane	83
1,1,2-Trichloroethane	5
1,1-Dichloroethene	7
1,2-Dichloroethane	5
1,2-Dichloroethene	900
2-Butanone *	53800
Acetone	10200
Bromodichloromethane *	100
Carbon Tetrachloride	5
Chloroform	100
Methylene Chloride	5
Tetrachloroethene	5
Toluene *	1000
Trichloroethene	5
Vinyl Chloride	2
Neptunium *	0.54 pCi/L
Radium *	0.65 pCi/L
Technetium	3790 pCi/L
Thorium *	2.5-4.9 pCi/L

*Indicates a single detection

Table 2.3. Berea groundwater COCs

Contaminants of Concern	Berea Groundwater PRG (μg/L)
2,4-Dinitrotoluene *	0.397
Hexachlorobenzene *	1
Hexachlorobutadiene *	3.7
Pentachlorophenol *	1
1,1,2-Trichloroethane	5
Acrolein *	1.03
Methylene Chloride *	5
Trichloroethene *	5

*Indicates a single detection

The principal groundwater flow system for PORTS is limited to four primary geologic and hydraulic units (Minford, Gallia, Sunbury, and Berea). The uppermost unconsolidated unit is the Minford with an approximate thickness of 25 to 30 ft. The Gallia unit underlies the Minford and is relatively thick (6 to 12 ft) in the X-701B Groundwater Area. The Gallia and Minford comprise the unconsolidated aquifer at PORTS with a relatively low average hydraulic conductivity of 3.4 ft/day. Gallia groundwater flow in the X-701B Groundwater Area is assumed to be affected by the basement sumps in the X-705 building pumping groundwater collected in these sumps to the X-622T facility for treatment. The uppermost bedrock unit is the Sunbury Shale unit. The Berea Sandstone underlies the Sunbury Shale and is the uppermost bedrock aquifer at PORTS. The Berea is present at approximately 35 ft below land surface in this area and groundwater flow is generally to the east.

The primary source of water in the hydrogeologic flow system in the X-701B Groundwater Area is natural recharge through precipitation. Leakage from storm sewers and other buried pipelines in the plant complex is not considered a large source of recharge in the X-701B Groundwater Area. The rate of recharge varies across the site as a result of surface development (i.e., buildings, parking lots, or open fields) and also as a result of the thickness of the surficial Minford aquitard. In general, a downward vertical gradient has been observed through each of the four major hydrogeologic units underlying the site. However, because the Sunbury Shale thins along the western portion of Quadrant II, communication between the Gallia and Berea is increased. The vertical gradient between the Gallia and Berea units is greatest where the Sunbury is thick, competent shale.

Natural groundwater flow beneath the X-701B Groundwater Area is directed to the east and northeast. The flow direction is the same for both the Gallia and Berea units. Groundwater flow direction in both the Minford and the Gallia are affected by the presence of drainage ditches and holding ponds, the most predominant areas being the X-230J7 Holding Pond and the East Drainage Ditch. Vertical hydraulic gradients in this area are generally downward except to the west in the vicinity of the X-700/X-705 buildings, where vertical gradients indicate possible upward flow from the Berea to the Gallia. This is due to thinning or absence of the Sunbury Shale in this area. Groundwater recharge to the Gallia and Berea in the X-701B Groundwater Area is reduced because of the many paved areas, buildings, and the presence of thick upper Minford Clay deposits. Pumping of groundwater from sumps located in the X-705 Decontamination Building to the X-622T Groundwater Treatment Facility has influenced water levels over a large portion of this area and modified the direction of groundwater flow.

The 1998 configuration of the TCE contamination in the Gallia in the Quadrant II Groundwater Investigative Area is shown on Fig. 2.3. Two areas of groundwater contamination exist in this quadrant. The 7-Unit Groundwater Area contamination extends from the former X-720 Neutralization Pit area northwest to the north end of the X-705 building. Contaminant concentrations exceed 1000 μg/L in the central portion of this plume. The second area of contamination, the X-701B Groundwater Area, extends east from the vicinity of the former X-701B Holding Pond to the vicinity of Little Beaver Creek. The plume width does not exceed 500 ft. TCE concentrations in the most contaminated portions of this plume exceed 100,000 ug/L.

Foreseeable corrective measures that could be chosen and implemented to control and remediate these groundwater plumes could range from institutional controls/natural attenuation to aggressive chemical, biological, and phytological treatment. Any one or a combination of these methods may be selected. Groundwater monitoring would be initiated to assess the effectiveness of the chosen corrective measures. The groundwater monitoring program would use existing monitoring wells to continue to monitor contaminant fate and transport. Implementation of some of the corrective measures, depending on location, may require the relocation/demolition of existing structures such as the X-747G Precious Metal Storage Yard as discussed in section 2.1.1.4.

2.1.2.1 Oxidant Injection

Oxidant injection is the process of applying a chemical which will react with contaminants to render them innocuous. This technology may be used to treat the X-701B groundwater plume. One possible implementation scenario using this technology is the injection of dilute hydrogen peroxide in the western portion of the plume (west of Perimeter Road). Several groundwater extraction wells would be used to control the direction of groundwater flow.

2.1.2.2 Vacuum Enhanced Recovery

Vacuum enhanced recovery (VER) is the process of extracting total fluids, both liquids and vapors, from a control well. Groundwater is extracted with the purpose of lowering the water table, exposing more of the contaminated soil to air, thus expanding the vadose zone. Air movement can be accomplished much more effectively than water movement in the subsurface so cleanup can progress more rapidly. VER is applied to remove volatile organic compounds, which easily transfer from the water phase or adsorbed phase on soils to the vapor phase. VER wells may be used to extract vapor and groundwater in the central portion of the plume (east of Perimeter Road).

2.1.2.3 Steam Stripping/Electrical Resistance Heating (ERH)

Steam stripping and ERH are processes that heat contaminated soil and groundwater to vaporize volatile contaminants; thereby making extraction easier using standard vapor extraction techniques such as VER. The steam may be generated ex-situ and injected or volatilization can be conducted in-situ using techniques such as the application of electrical voltage using electrodes to heat the water and/or contaminants to the boiling point (ERH). Subsurface vapor extraction wells would be used to remove steam and contaminant vapors as they are produced. A steam condenser would separate the mixture of soil vapors, steam, and contaminants extracted from the subsurface. These techniques may be employed in areas where high concentrations of contaminants make other remediation measures less efficient. A further discussion of the ERH process is included in Appendix E.

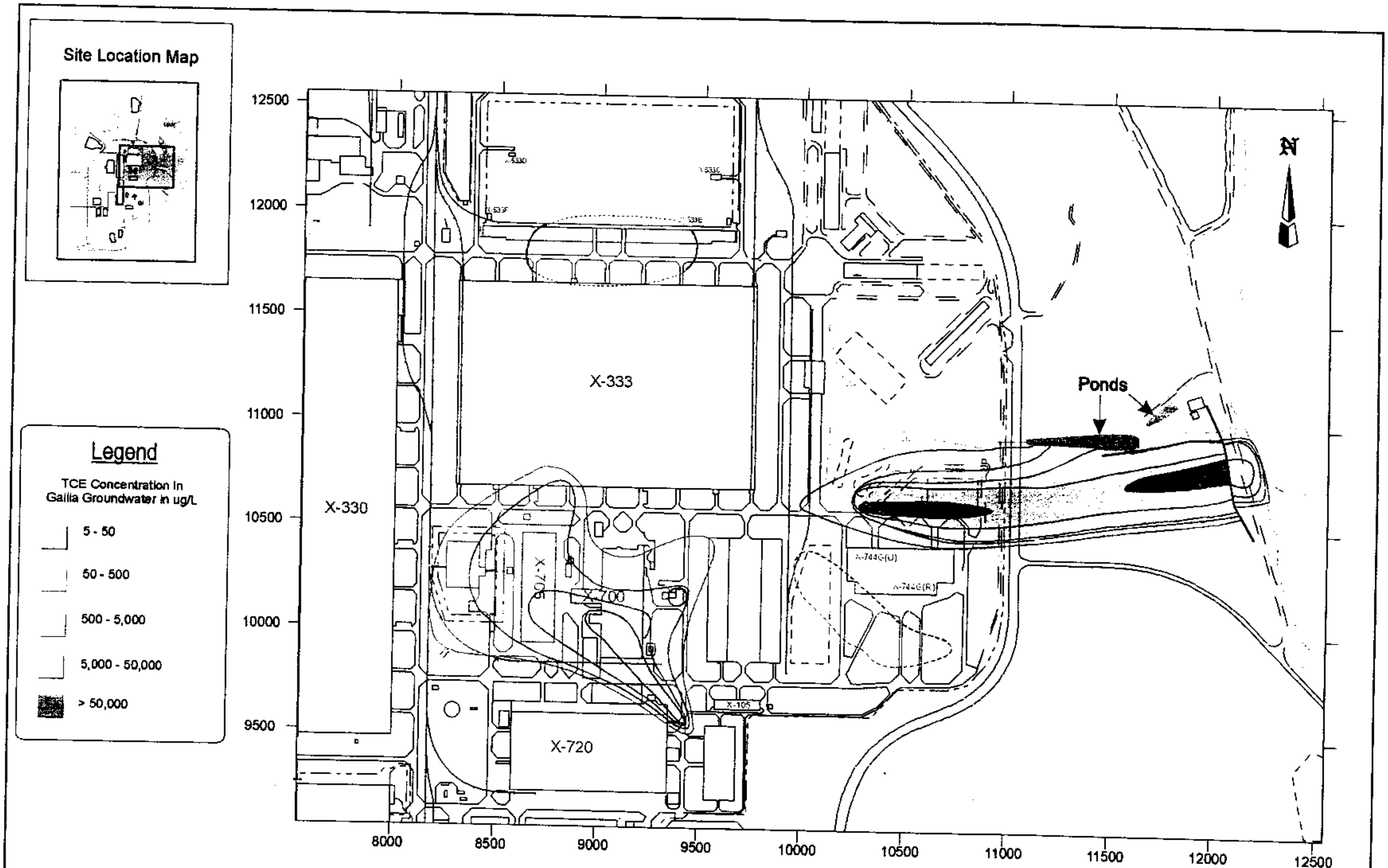

Fig. 2.3	Quadrant II Groundwater Investigative Area (1998 Plume Map)	DOCUMENT ID: Q2 EA DOE/EA-1459	DRAWING ID: Fig 2.3 Q2EA Plume 1998.CDR	DRAWING DATE: February 5, 2002 RA

2.1.2.4 Bioremediation

Bioremediation is the process of degrading a contaminant in an aerobic environment through a cometabolic process. Bacteria use the carbon associated with organic contaminants as a food source resulting in the breakdown of the organic contaminant into non-toxic constituents. Additional material can be added to enhance the existing food source to induce biodegradation in an aerobic environment. One of the possible applications of this technology may be an upgrade of an existing groundwater treatment facility. For example, the X-624 Groundwater Treatment Facility currently treats groundwater collected at the X-701B IRM Interceptor Trench. This facility may be demolished and replaced with a new building and treatment system to be located near the existing facility. The new treatment system would replace the current air stripper with an aerobic biological treatment unit, which would be supported by new injection and extraction wells. Current treatment media and chemicals would be reused at other treatment facilities or disposed of utilizing existing waste disposal procedures.

2.1.2.5 Phytoremediation

Trees would be planted in the eastern portion of the plume to promote phytoextraction of groundwater. Studies have shown that the root systems of the certain trees are capable of reaching depths significantly beyond the depth of the groundwater table in the vicinity of the X-701B Groundwater Plume Containment Trench, which is approximately 5 ft below land surface. The trees absorb trace minerals and contaminants from the soil and groundwater. A portion of the volatile organic compounds (VOCs) is metabolized within the tree and the remainder is transpired through the bark and leaves. The transpired TCE vapor is rapidly degraded in the atmosphere by ultraviolet light. The sugars and oxygen provided by the tree serve as nutrients for bacteria in the soil. The bacteria, promoted by the tree growth, aid in the in situ biodegradation of contaminants around the tree roots. By breaking down organic contaminants, bacteria obtain carbon and energy to help sustain bacterial reproduction processes.

2.1.2.6 Continue current groundwater treatment

Basement sumps in the X-705 Decontamination Building would continue to pump groundwater to the X-622T Groundwater Treatment or a replacement facility and the X-701B Interim Remedial Measures (IRM) trench would continue to extract contaminated groundwater and pump to the X-624 Groundwater Treatment Facility or its replacement for the next 30 years (based on model simulation). The X-622T and X-624 Groundwater Treatment Facilities currently treat portions of the Quadrant II groundwater plumes using carbon absorption and an air stripping system.

2.1.2.7 Replace existing groundwater treatment facilities with new treatment facilities

The X-622T and X-624 facilities may be replaced with new facilities and equipment to allow continued support for corrective measures. These replacements may be necessary because the existing facilities, constructed in 1991, have reached the end of their normally expected useful life. If it is to be replaced, X-622T, which is a trailer-mounted unit, will be demolished. X-622T would be replaced with a new building and treatment system located approximately near the existing facility. The replacement facility would be built with an increase in treatment capacity and may require the installation of an additional extraction well (8 in. to 10 in. diameter) installed in the area of the 7-Unit Groundwater Plume. Modifications may also need to be made to the X-624 facility to allow continued operation in the future due to the age of the existing equipment. Current treatment media and chemicals would be reused in the new facilities or disposed of utilizing existing waste disposal procedures.

2.2 NO ACTION

Under the no action alternative, no treatment, containment, removal, or monitoring of the environmental media would be performed beyond what is currently being performed in Quadrant II. Access restrictions to PORTS in its current condition would continue at its present level. Although contaminant toxicity, mobility, and total volume may still be reduced through the natural processes of attenuation (i.e., dispersion, dilution, and adsorption), the time to reach acceptable levels would be extremely long (> 30 years). No monitoring effort would be included in this alternative beyond current levels. DOE would not be able to comply with its obligations under the ACO agreed to with the U.S. EPA and Ohio EPA. The no action alternative would allow short-term exposure risks to on-site workers to continue at present levels. The long-term exposure risk associated with this alternative may increase if either access restrictions or the present level of contaminant controls and monitoring were terminated in the future. Activities associated with site cessation, such as development of land use controls, may require additional NEPA review.

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3. AFFECTED ENVIRONMENT

Elements of the Affected Environment are also described in the Quadrant II CAS/CMS [Chapter 1.3].

3.1 LAND AND FACILITY USE

PORTS is situated on a 1503-ha (3714-acre) parcel of DOE-owned land (Fig. 1.2). The Perimeter Road surrounds a 485.6-ha (1200-acre) centrally developed area. The terrain surrounding the plant, except for the Scioto River floodplain, consists of marginal farmland and densely forested hills. The Scioto River floodplain is farmed extensively, particularly with grain crops.

The reservation land outside the Perimeter Road is used for a variety of purposes, including a water treatment plant, holding ponds, sanitary and inert landfill, and open and forested buffer areas. The majority of the site improvements associated with the GDP are located within the 202-ha (500-acre) fenced area. Within this area are three large process buildings and auxiliary facilities that are currently leased to USEC. A second, large developed area covering about 121 ha (300 acres) contains the facilities built for GCEP. These areas are largely devoid of trees, with grass and paved roadways dominating the open space. The remaining area within the Perimeter Road has been cleared and is essentially level. Controlled access exists within the limited security area as well as closed sites.

Approximately 190 buildings as well as the utility structures are located within the PORTS site. In general, the X-100 through X-700 series of buildings are directly related to the gaseous diffusion process. Most of the buildings in this series are located within the 202-ha (500-acre) fenced area. The X-200 and X-300 series are the production buildings and related infrastructure facilities. Most of the buildings and infrastructure included in the X-1000 through X-7000 series of buildings are located within the 121-ha (300-acre) GCEP expansion area. The facilities containing the administrative activities include the facilities numbered in the X-100 series for the GDP and X-1000 series for the more recent construction. The facilities house such activities as administrative offices, engineering, cafeteria, medical services, security, and fire protection.

The X-500 series in the GDP and the X-5000 series in the GCEP area pertain to the power operations facilities. Included are switchyards, switch houses, valve houses, and test and repair facilities. The X-600 and X-6000 series of facilities are utility related functions. Included are a steam plant, well fields, pump houses, a water treatment plant, a sewage treatment plant (STP), and numerous cooling towers. In addition, dry air and nitrogen generation facilities are housed in the GDP process buildings. The X-700 and X-7000 series of buildings house chemical operations, a laboratory, maintenance shops, and numerous storage facilities. The major maintenance facility for the GDP is the X-720 building. The building contains more than 91,440 m^2 (300,000 ft^2) of space for various shop activities, offices, and storage of parts. The GCEP-equivalent facility is the X-7721 Maintenance, Stores, and Training Building located in the 121-ha (300-acre) expansion area. The X-7721 building contains more than 36,576 m^2 (120,000 ft^2) of space.

The uranium enrichment production and operations facilities at PORTS are leased by USEC. The lease between DOE and USEC is active through July 1, 2010, although some facilities may be returned to DOE on an earlier date. Besides the leased facilities, USEC also leases common areas that include ditches, creeks, ponds, and other areas (i.e., roads and rail spurs) necessary for ingress, egress, and proper maintenance of facilities.

3.2 CLIMATE AND AIR QUALITY

3.2.1 Climate

PORTS is located in the humid continental climate zone of North America and has weather conditions that vary greatly throughout the year. The mean annual temperature is about 12.7°C (55°F). Average summer and winter temperatures are 22.2°C (72°F) and 0°C (32°F), respectively. Record high and low temperatures are 39.4°C (103°F) and –32°C (–25°F), respectively.

Prevailing winds are out of the south–southwest and average 8.05 kilometers per hour (km/h) [5 miles per hour (mph)]. The highest monthly average wind speed, 17.7 km/h (11 mph), typically occurs in the spring. Total precipitation averages approximately 101.6 cm (40 in.) annually and is usually well distributed throughout the year. Fall is the driest season. Snowfall averages approximately 51.8 cm/year (20.4 in./year). Although snow amounts and frequencies vary greatly from year to year, an average 8 d/year have greater than 2.54 cm (1 in.) of snowfall.

3.2.2 Air Quality

The PORTS region is classified as an attainment area for the pollutants listed in the National Ambient Air Quality Standards (NAAQS). These standards are shown in Table 3.1. Primary standards protect against adverse health effects, while secondary standards protect against welfare effects such as damage to crops, vegetation, and buildings. The State of Ohio has adopted the NAAQS and regulations to guide the evaluation of hazardous air pollutants and toxins to specify permissible short- and long-term concentrations.

PORTS is located in a Class II prevention of significant deterioration (PSD) area. PSD regulations were established to prevent significant deterioration of air quality in areas that already meet the NAAQS. Specific details of PSD are found in 40 *CFR* 51.166. Among other provisions, cumulative increases in sulfur dioxide, nitrogen dioxide, and particulate matter less than 10 microns in diameter (PM-10 levels) after specified baseline dates must not exceed specified maximum allowable amounts. These allowable increases, also known as increments, are especially stringent in areas designated as Class I areas (e.g., national parks and wilderness areas) where the preservation of clean air is particularly important. All areas not designated as Class I currently are designated as Class II. The nearest Class I PSD area is the Dolly Sods Wilderness Area, which is approximately 280 km (174 miles) east of PORTS in West Virginia. Since PORTS is located in an area that is currently in compliance with the NAAQS and considered an attainment area, a conformity analysis as described in 40 *CFR* 51.853 is not applicable.

Airborne discharges of radionuclides from PORTS are regulated under the CAA National Emission Standards for Hazardous Air Pollutants (NESHAP). Releases of radionuclides are used to calculate a dose to members of the public (Sect. 3.11.1).

The majority of radiological emissions at PORTS resulted from the uranium enrichment process operated by DOE until 1993 and subsequently by USEC. In 2000, USEC reported emissions of 0.09 Ci (curie: a measure of radioactivity) from its 19 radionuclide sources. DOE-PORTS is responsible for four radiological emission sources, the X-326 L-Cage glove box, the X-744G glove box, and the X-623 and X-624 Groundwater Treatment Facilities. The glove boxes are used to repackage wastes or other materials that contain radionuclides. The two groundwater treatment facilities emit small quantities of radionuclides to the air in the process of removing chemical contaminants from the groundwater. Emissions from these sources are based on waste analysis data and standard engineering procedures. Radiological emissions from these two DOE sources were 0.000063 Ci in 2000 (DOE 2001c).

Nonradiological releases to the atmosphere are permitted under the Ohio Permit to Operate regulations. Under Ohio regulations, the Ohio EPA can register small emission sources rather than issue a formal permit. DOE-PORTS had 4 permitted and 10 registered air emission sources at the end of 2000.

Table 3.1 Air quality standards

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)		Allowable PSD increment ($\mu g/m^3$)[a]	
		Primary	Secondary	Class I	Class II
Sulfur dioxide	3 h[b]		1300	25	512
	24 h[b]	365		5	91
	Annual	80		2	20
Nitrogen dioxide	Annual	100	100	2.5	25
Ozone	1 h[c]	235	235		
	8 h[d]	157	157		
Carbon monoxide	1 h[b]	10,000			
	8 h[b]	40,000			
PM-10[e]	24 h[c]	150	150	8	30
	Annual	50	50	4	17
PM-2.5[f,d]	24 h	65	65		
	Annual	15	15		
Lead	3 months[g]	1.5	1.5		

Note: Where no value is listed, there is no corresponding standard.
[a]Class I areas are specifically designated areas in which degradation of air quality is severely restricted; Class II areas have a less stringent set of allowable increments.
[b]Not to be exceeded more than once per year.
[c]Not to be exceeded more than one day per year on average over 3 years.
[d]The ozone 8-h standard and the PM-2.5 standards are included for information only. A 1999 federal court ruling blocked implementation of these standards, which the U.S. EPA proposed in 1997.
[e]Particulate matter less than 10 μm in diameter.
[f]Particulate matter less than 2.5 μm in diameter.
[g]Calendar quarter.
NAAQS = National Ambient Air Quality Standard.
PSD = prevention of significant deterioration.

DOE-PORTS operates numerous small sources of conventional air pollutants such as nitrogen oxides, sulfur dioxide, and particulate matter. These emissions are estimated every 2 years for the Ohio EPA's biennial emission fee statement. Emissions of nonradiological air pollutants at PORTS are estimated using various U.S. EPA-approved procedures. In calculating air emissions, DOE assumes that each source emits the maximum allowable amount of each pollutant as provided in the permit or registration for the source. Under this worst-case scenario, DOE-PORTS estimated emissions of sulfur dioxide, nitrogen oxides, organic compounds, and particulate matter in 1999 to be 13 tons/year. Most of these worst-case emissions resulted from particulate (dust) emissions from the X-734 landfill closure. Worst-case air emissions excluding this source are no more than 1.5 tons/year (DOE 2000c). Emissions for 2000 are not calculated until 2002, but are expected to be similar to 1999 (DOE 2001c).

The largest non-radiological airborne discharges from USEC sources are from the coal-fired boilers at the X-600 steam plant. The boilers are permitted by Ohio EPA with opacity, particulate, and sulfur dioxide limits. Electrostatic precipitators on each of the boilers control opacity and particulate emissions. In addition, the boilers emit nitrogen oxides and carbon monoxide. There are also minor contributions of these pollutants from oil-fired heaters, stationary diesel motors, and mobile sources (e.g., cars and trucks).

Other air pollutants emitted from USEC operations include gaseous fluorides, water treatment chemicals, cleaning solvent vapors, and process coolants.

In October 2000, DOE collected data from a monitoring network of 15 air samplers. Data were collected both on-site at PORTS and in the area surrounding PORTS. The monitoring network is intended to assess whether air emission from PORTS affect air quality in the surrounding area. The air sampling stations collect samples which are analyzed for americium-241, neptunium-237, plutonium-238, plutonium-239/240, plutonium-242, thorium-228, thorium-230, thorium-232, uranium-233/234, uranium-235, uranium-236, uranium-238, percent uranium-235, and total uranium. A background ambient air monitoring station is located approximately 21 km (13 miles) southwest of the site. The analytical results from air sampling stations closer to the plant are compared to these background measurements.

The latest air monitoring results for the site are published in the U.S. Department of Energy, Portsmouth Annual Environmental Report for 2000 (DOE 2001c).

3.3 GEOLOGY AND SOILS

3.3.1 Site Geology

The near-surface geologic materials that influence the hydrologic system at PORTS consist of several bedrock formations and unconsolidated deposits. The bedrock formations include (from oldest to youngest) Bedford Shale, Berea Sandstone, Sunbury Shale, and Cuyahoga Shale. The unconsolidated deposits of clay, silt, sand, and gravel compose the Minford Clay and Silt (Minford) member and the Gallia Sand and Gravel (Gallia) member of the Teays formation (DOE 1996a). Prior to the Pleistocene glaciation, the Teays River and its tributaries were the dominant drainage system in Ohio.

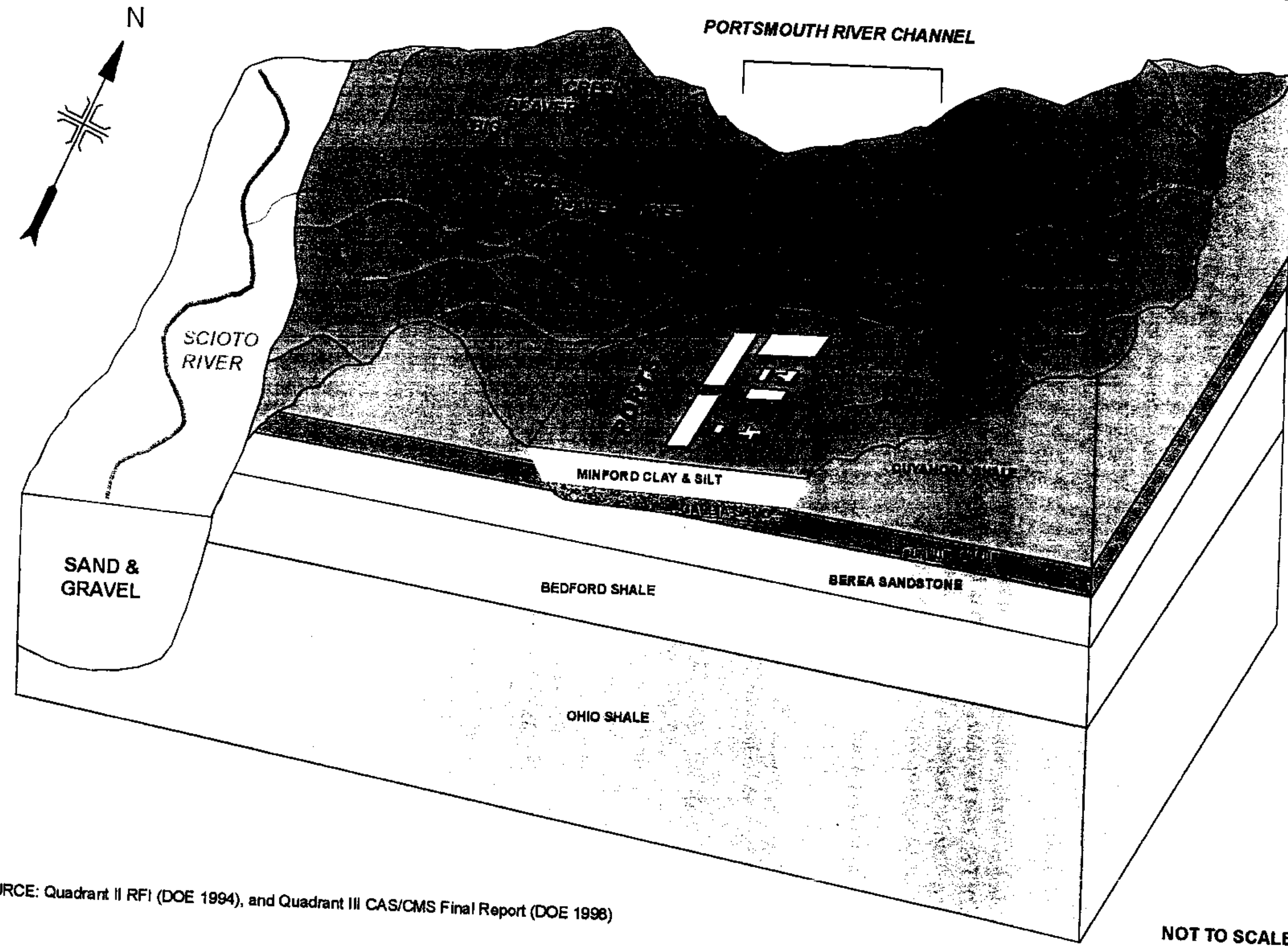
The pre-glacial Portsmouth River, a tributary of the Teays, flowed north across the plant site, cutting down through the Cuyahoga Shale and into the Sunbury Shale and Berea Sandstone, and deposited fluvial silt, sand, and gravel of the Gallia member of the Teays Formation (Fig. 3.1).

3.3.2 Bedrock Geology

Bedrock consisting of clastic sedimentary rocks underlies the unconsolidated sediments beneath PORTS. The geologic structure of the area is very simple, with the bedrock (Cuyahoga Shale, Sunbury Shale, Berea Sandstone, and Bedford Shale) dipping gently to the east–southeast. No known geologic faults are located in the area; however, joints and fractures are present in the bedrock formations.

The Bedford Shale is the lowest stratigraphic unit encountered during environmental investigative activities at the site. Bedford Shale is composed of thinly bedded shale with interbeds and laminations of grey, fine-grained sandstone and siltstone. The typical depth to the top of this formation at PORTS is 21.3 to 30.5 m (70 to 100 ft) below ground surface (bgs). However, Bedford Shale outcrops are present in deeply incised streams and valleys within the reservation. The Bedford Shale averages 30.5 m (100 ft) in thickness.

The Berea Sandstone is a light grey, thickly bedded, fine-grained sandstone with thin shale laminations. The top 3.05 to 4.57 m (10 to 15 ft) consists of a massive sandstone bed with few joints or shale laminae. The Berea Sandstone averages 10.67 m (35 ft) in thickness; however, the lower 3.05 m (10 ft) has numerous shale laminations and is very similar to the underlying Bedford Shale. This gradational contact does not allow for a precise determination of the thickness of the Berea Sandstone.



SOURCE: Quadrant II RFI (DOE 1994), and Quadrant III CAS/CMS Final Report (DOE 1998)

NOT TO SCALE

Pro2Serve	Fig. 3.1	Schematic block diagram showing geology at PORTS.	DOCUMENT ID: DOE/EA-1459	DRAWING ID: Fig3-1a Q2EA.cdr	DRAWING DATE: May 18, 2001

Regionally, Berea Sandstone contains naturally occurring hydrocarbons (oil and gas) in quantities sufficient for commercial production. Generally, within Perimeter Road, the Berea Sandstone is the uppermost bedrock unit beneath the western portion of PORTS but is overlain by the Sunbury Shale to the east.

The Sunbury Shale is a black, very carbonaceous shale. The Sunbury Shale is 6.09 m (20 ft) thick beneath much of PORTS, but thins westward as a result of erosion by the ancient Portsmouth River, and is absent on the western half of the site. The Sunbury Shale also is absent in the drainage of Little Beaver Creek downstream of the X-611A Lime Sludge Lagoons and the southern portion of Big Run Creek, where it has been removed by erosion. The Sunbury Shale underlies the unconsolidated Gallia beneath the most industrialized eastern portion of the plant and underlies the Cuyahoga Shale outside of the Portsmouth River Valley.

The Cuyahoga Shale, the youngest and uppermost bedrock unit at the site, forms the hills surrounding PORTS. The Cuyahoga Shale has been eroded from most of the active portion of PORTS. It consists of grey, thinly bedded shale with scattered lenses of fine-grained sandstone and regionally reaches a thickness of approximately 48.77 m (160 ft).

3.3.3 Unconsolidated Deposits

Unconsolidated deposits in the vicinity of PORTS fill the ancient Portsmouth River Valley to depths of approximately 9.1 to 12.2 m (30 to 40 ft). The unconsolidated deposits are divided into two members of the Teays Formation, the Minford Clay and Silt and the Gallia Sand and Gravel.

Minford Clay and Silt. The Minford is the uppermost stratigraphic unit beneath PORTS. The Minford averages 6.1 to 9.1 m (20 to 30 ft) in thickness and grades from predominantly silt and very fine sand at its base to clay near the surface. The upper clay unit averages 4.88 m (16 ft) in thickness, is reddish-brown, plastic, and silty, and contains traces of sand and fine gravel in some locations. These thicknesses vary greatly as a result of construction cutting and filling operations, as discussed in the next paragraph. The lower silt unit averages 2.13 m (7 ft) in thickness, is yellow-brown and semi-plastic, and contains varying amounts of clay and very fine sand.

During the initial grading of the site, the deposits within the Perimeter Road were reworked to a depth as great as 6.1 m (20 ft) by pre-construction cut and fill activity. In most cases, the fill is indistinguishable from the undisturbed Minford. The combination of construction activities, bedrock topography, and erosion by modern streams has influenced the areal extent and thickness of the Minford at PORTS.

Gallia Sand and Gravel. Prior to Pleistocene glaciation, the Portsmouth River meandered north through the valley currently occupied by PORTS and deposited the sand and gravel of the Gallia. The Gallia averages 0.9 to 1.22 m (3 to 4 ft) in thickness at the site and is characterized by poorly sorted sand and gravel with silt and clay. Channel migration and variation in depositional environments that occurred during deposition of the Gallia resulted in the variable thickness of the Gallia. The areas of thickest accumulation of Gallia may represent the former channel location and include areas under the southern end of the X-330 Process Building and near the X-701B Holding Pond. Gallia deposits beneath PORTS are generally absent above an approximate elevation of 198 m (650 ft) above mean sea level (AMSL).

As a result of similar depositional environments and source material, deposits from modern streams at the site often are visually indistinguishable from Gallia deposits. The modern surface-water drainage also has eroded the unconsolidated sediments and resulted in locally thin or absent Gallia and Minford deposits.

3.3.4 Surface Soil Description

According to the Soil Survey of Pike County, Ohio, 22 soil types occur within the PORTS property boundary with the predominant soil type being Omulga Silt Loam (U.S. Department of Agriculture 1990). Most of the area within the active portion of PORTS is classified as Urban land-Omulga complex with a 0 to 6% slope, which consists of Urban land and a deep, nearly level, gently sloping, moderately well-drained Omulga soil in preglacial valleys. The Urban land is covered by roads, parking lots, buildings, and railroads that are so obscure or alter the soil that identification of the soil series is not feasible.

The surface layer of Omulga Silt Loam is dark grayish-brown, friable (easily crumbled), and approximately 25.4 cm (10 in.) thick. The subsoil is approximately 137.2 cm (54 in.) thick and is composed of three portions: (1) a yellowish-brown, friable silt loam; (2) a fragipan (brittle, compacted subsurface soil) of yellowish-brown, mottled, firm, and brittle silty clay loam middle; and (3) a yellowish-brown, mottled, friable silt loam approximately 50.8 cm (20 in.) thick. The root zone generally is restricted to the zone above the fragipan and contains none of the Urban land soils. Well-developed soil horizons may not be present in all areas inside Perimeter Road because of cut-and-fill operations related to construction.

Prime farmland is land that has the best combination of physical and chemical characteristics for producing crops of statewide or local importance. Seven of the soils that occur within the PORTS property are listed in the Pike County Soil Survey as prime farmland soils. Prime farmland is protected by the Farmland Protection Policy Act which seeks "...to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmlands to nonagricultural uses..." [7 USC 4201(b)]. No formal prime farmland soil survey has been conducted at PORTS.

Although containing some of the soil types considered prime farmland types, the areas affected by the proposed action have not been farmed since the early 1950's when the Gaseous Diffusion Plant and support facilities were constructed. Since that time these areas have been incorporated into the industrial site and are no longer considered suitable for conversion to farmland.

3.3.5 Seismicity

Geological studies conducted to determine the potential seismic hazard for PORTS have determined that only one fault is located within 40 km (25 miles) of the site, and no seismicity has been recorded on it and no recorded seismic events have occurred within 40 km (25 miles) of the site. The Kentucky River fault zone and the Bryant Station-Hickman Creek fault are located farther away from PORTS, the latter fault being roughly 96.5 km (60 miles) to the southwest. These faults bound the southern part of a north-to-northeast-trending area of seismicity in central and eastern Ohio. Soil testing for the GCEP facility indicated that the potential for earthquake-induced soil liquefaction is relatively low. The potential for soil-structure interaction (ground motion magnification) is also slight. Also, Pike County is not one of the political jurisdictions listed in Appendix VI of 40 *CFR* 264 for which compliance with seismic standards must be demonstrated (MMES 1994).

3.4 WATER RESOURCES

3.4.1 Groundwater

3.4.1.1 Site hydrogeology

The groundwater flow system at PORTS includes two water-bearing units (the bedrock Berea Sandstone and the unconsolidated Gallia) and two aquitards (the Sunbury Shale and the unconsolidated

Minford). The basal portion of the Minford is generally grouped with the Gallia to form the uppermost and primary aquifer at the facility. The hydraulic properties of these units and groundwater flow at the site also have been well defined during the RFI.

Groundwater recharge and discharge areas at PORTS include both natural and man-made recharge and discharge areas. Natural recharge to the groundwater flow system at PORTS comes from precipitation.

Land use and the presence of thick upper Minford Clay and the Sunbury Shale effectively reduce recharge to underlying units. Recharge to the Minford and Gallia is reduced because a large percentage of the land is paved or covered by buildings. However, recharge to the Berea Sandstone from the overlying Gallia is increased as a result of the absence of the Sunbury Shale.

Groundwater flow at PORTS can generally be divided into four separate flow regions. Groundwater divides provide the basis for separation of the reservation into quadrants. The groundwater divides generally coincide with topographic highs along the center of the industrial complex (from south to north) and topographic highs radiating outward and separating the predominant surface water features draining the facility. The locations of the groundwater flow divides may migrate small distances in response to seasonal changes in precipitation and groundwater recharge. The rates of pumping the X-700/X-705 sumps and remediation wells can also influence the location of the groundwater divides in some areas.

Groundwater at PORTS discharges primarily to surface streams. Groundwater in the eastern and northern portions of the facility discharges to the East and North Drainage Ditches and to the Little Beaver Creek. In the southern portion of the facility, groundwater discharges to the Big Run Creek and to the unnamed southwest drainage ditch. Along the western boundary of the site, the West Drainage Ditch serves as a local discharge area for all geologic units.

Groundwater recharge and discharge areas at PORTS also are affected by man-made features including the storm sewer system, the sanitary sewer system, the recirculating cooling water (RCW) system, water lines, and building sumps. The storm sewer system consists of numerous large-diameter culverts and pipes that drain surface water from discrete segments of the site. Groundwater collected by these drains is transported to the discharge point for each storm drain. Discharge points for the storm drains generally coincide with site National Pollutant Discharge Elimination System (NPDES) outfalls that eventually discharge to the surface water units described previously. The RCW and fire hydrant supply systems are pressurized to ensure proper transport of water. If these systems have leaks, they may locally act as sources of recharge to groundwater. Although recharge from these lines to groundwater is difficult to measure, overall groundwater directions are not affected. These systems are generally located within 1.8 to 3.7 m (6 to 12 ft) of the ground surface. The depth to groundwater generally is more than 3.7 m (12 ft) below the ground surface. Consequently, these systems and their associated backfills are usually located above the local water table. On the basis of these factors, none of these systems appears to act as a major discharge conduit for groundwater. Man-made features that do have a major effect on groundwater flow at the site include a set of sumps located in the X-700 Cleaning and the X-705 Decontamination Buildings, extraction wells in the vicinity of X-231B Oil Biodegradation Plot, X-701B Holding Pond, and groundwater interceptor trenches at X-749 Contaminated Material Storage Yard and X-701B Holding Pond area.

Groundwater is used as a domestic, municipal, and industrial water supply in the vicinity of PORTS. Most municipal and industrial water supplies in Pike County are developed from the Scioto River Valley buried aquifer. Groundwater in the Berea sandstone and Gallia sand formations that underlie PORTS is not used as domestic, municipal, or industrial water supplies. Domestic water supplies are obtained from either unconsolidated deposits in pre-glacial valleys, major tributaries to the Scioto River Valley, or from fractured bedrock encountered during drilling.

The PORTS reservation is the largest industrial user of water in the vicinity and obtains its water from the X-608, X-605G, and X-6609 water supply well fields, which are next to the Scioto River south of Piketon. The wells tap the Scioto River Valley buried aquifer. Total groundwater production averages 49.4 million liters per day (L/d) [13 million gals per day (MGD)] for the entire site, including USEC activities (DOE 1999b).

3.4.1.2 Groundwater monitoring

Groundwater and surface water monitoring at PORTS was initiated in the mid 1980s. Groundwater monitoring has been conducted in response to regulatory requirements of the Ohio Administrative Code, RCRA closure documents, an ACO between DOE and the U.S. EPA, a Consent Decree between the DOE and the State of Ohio, and DOE Orders.

Because of the numerous regulatory programs, the *Integrated Groundwater Monitoring Plan* (IGWMP) was developed to minimize the potential for confusion in interpreting requirements and to maximize resources for collecting the data needed for sound decision making and was designed to establish all groundwater monitoring requirements for PORTS. The IGWMP was reviewed and approved by Ohio EPA and implemented at PORTS starting on April 1, 1999. The IGWMP is revised as monitoring needs change. The latest approved version of the IGWMP was issued in October 2001.

The process of developing an integrated groundwater monitoring program at PORTS began by selecting or designating relatively large-scale contamination areas called groundwater Areas of Concern. Areas of Concern at PORTS are generally large areas containing multiple source/release sites contributing to physically contiguous or co-mingled contaminant plumes or remediation concerns that are the subject of corrective actions or RCRA closures.

In addition to the detection and assessment monitoring at PORTS, the integrated approach to groundwater monitoring includes perimeter exit pathway monitoring, sampling selected surface water locations and sampling PORTS water supply and surrounding residents' drinking water. Additional information and monitoring results are provided in the 2000 Groundwater Monitoring Report (DOE 2001d).

In general, samples are collected from wells at each area listed above and are analyzed for metals, volatile organic compounds (VOCs), and radiological constituents. Data for the X-749A Classified Materials Disposal Facility (part of the Quadrant I Groundwater Investigative Area) and the X-735 Landfills are also statistically evaluated to determine whether the areas have impacted groundwater.

Groundwater plumes that consist of VOCs, primarily TCE, are found at the X-749/X-120/Peter Kiewit Landfill, Quadrant I Groundwater Investigative Area, Quadrant II Groundwater Investigative Area, X-701B Holding Pond Area, and X-740 Hazardous Waste Storage Facility Area.

Selected monitoring wells, monitoring frequency, and analytical parameters are included in the IGWMP for each of the groundwater Areas of Concern listed below:

<u>Quadrant I</u>

X-749 Contaminated Materials Disposal Facility/X-120 Old Training Facility/Peter Kiewit Landfill, Quadrant I Groundwater Investigative Area/X-749A Classified Materials Disposal Facility, Quadrant II

Quadrant II Groundwater Investigative Area,
X-701B Holding Pond Area,

Quadrant III

X-616 Chromium Sludge Surface Impoundments,
X-740 Hazardous Waste Storage Facility Area,

Quadrant IV

X-611A Former Lime Sludge Lagoons,
X-735 Landfills, and
X-734 Landfills.

Monitoring wells were selected to serve one or more of the following broad technical objectives: source/release monitoring, plume monitoring, and remedial-action-effectiveness monitoring. Source monitoring is designed to monitor as close as feasible to potential sources of groundwater contamination such as landfills and holding ponds. Plume monitoring is designed to assess the concentrations and extent of known contaminant plumes. Remedial-action-effectiveness monitoring is designed to evaluate the performance of interim remedial measures, corrective actions, or technology demonstrations. These broad technical purposes approximate the regulatory definitions of detection monitoring and assessment monitoring.

3.4.1.3 Groundwater treatment

In 2000, a combined total of approximately 20.7 million gal of contaminated groundwater was treated at the X-622, X-622T, X-623, X-624, and X-625 Groundwater Treatment Facilities. Approximately 129 gals of TCE were removed from the groundwater. All processed water is discharged through NPDES outfalls before exiting PORTS.

- X-622—TCE-contaminated groundwater from the 5-Unit Groundwater Investigative Area, the X-749 Landfill, and the Peter Kiewit groundwater collection system is processed at the X-622 treatment unit using activated carbon and green sand filtration.

- X-622T—At this treatment facility, activated carbon is used to treat contaminated groundwater from the X-700 Chemical Cleaning facility and the X-705 Decontamination Building. The contaminated groundwater is extracted from sumps located in the basement of each building.

- X-623—This groundwater treatment facility consists of an air stripper with off-gas activated carbon filtration and aqueous-phase activated carbon filtration. X-623 provides treatment for contaminated groundwater from the X-701B holding pond and three groundwater extraction wells in the X-701B plume area.

- X-624—TCE-contaminated groundwater from the X-237 interceptor trench associated with the X-701B plume is treated via an air stripper with off-gas activated carbon filtration, plus carbon filtration of the effluent water.

- X-625—Groundwater that is gravity fed to this facility (from a horizontal well associated with the X-749/X-120 groundwater plume and as part of an ongoing technology demonstration) is treated with various passive media such as iron fillings.

3.4.2 Surface Water

3.4.2.1 Site hydrology

PORTS is drained by several small tributaries of the Scioto River, which flows south to the Ohio River. Sources of surface water drainage include storm water runoff, groundwater discharge, and effluent from plant processes.

The largest stream on the site is Little Beaver Creek, which drains the northern and northwestern portions of the site before discharging into Big Beaver Creek. Little Beaver Creek is a small, high-gradient, unmodified stream that receives the majority of its flow from the X-230J7 East Holding Pond discharge through the East Drainage Ditch. Little Beaver Creek also receives effluent via the Northeast Drainage Ditch through the outfall from the X-230J6 Northeast Holding Pond and the North Drainage Ditch through the X-230L North Holding Pond Outfall. Substrates are predominantly slab boulders and bedrock at the upper reach to gravel and sand near the mouth. During parts of the year, intermittent flow conditions exist upstream from the X-230J7 discharge. During these times the upstream section is composed of isolated pools with no observable flow (Ohio EPA 1998).

Big Run Creek, located in the southeastern portion of the site, receives outfall effluent from the X-230K South Holding Pond at the headwaters of the stream. Big Run Creek continues southwest from the DOE property boundary until it discharges into the Scioto River, approximately 6.4 km (4 miles) from the site. The substrates are predominated by gravel and cobble, and the channel has remained unmodified. Because of the small stream size and high gradient, deep pools are absent. Big Run Creek often has intermittent flow during parts of the year (Ohio EPA 1993).

Two ditches drain the western and southwestern portions of the site; flow is low to intermittent. The West Drainage Ditch receives water from surface water runoff, storm sewers, and plant effluent. The unnamed southwest drainage ditch receives water mainly from storm sewers and groundwater discharge. These two drainage ditches continue west and ultimately discharge into the Scioto River.

3.4.2.2 Surface water monitoring

The quality of surface waters at PORTS is affected by wastewater discharges and groundwater transport of contaminants from land disposal of waste. Although bedrock characteristics differ somewhat among the watersheds of these surface waters, the observed differences in water chemistry are attributed to different contaminant loadings rather than to geologic variation (DOE 1999a). Water quality, radioactivity, and flow measurements are made at a number of stations operated by DOE. The frequency of surface water sampling (weekly, monthly, etc.) is specific to the analytes. Routine and permitted outfall samples are tested for radiological components (gross alpha, gross beta-gamma, technetium, and uranium), pH, flow, turbidity, TCE, oil and grease, heavy metals, fluorides, and phosphates.

Most surface water sampling at PORTS for nonradiological discharges is regulated by an NPDES permit enforced by the Ohio EPA. NPDES permit limitations regulate all plant process effluent discharged to the environment. The DOE-PORTS NPDES permit was issued in 1995 and modified in 1996 and 1997. The DOE-PORTS NPDES permit expired on March 31, 1999. DOE submitted a permit renewal application to Ohio EPA in 1998 in accordance with Ohio EPA requirements. The old permit will remain in effect until Ohio EPA issues a new permit. The Ohio EPA and U.S. EPA also conducted the annual inspection of all DOE-PORTS outfalls in June 2000. No problems were noted during the inspection.

DOE has six discharge points, or outfalls, through which water is discharged from the site. Three outfalls discharge directly to surface water (unnamed streams that flow to the Scioto River and Little Beaver Creek), and three discharge to the USEC X-6619 Sewage Treatment Plant before leaving the site through USEC Outfall 003 to the Scioto River. USEC is responsible for 11 NPDES outfalls at PORTS. Eight outfalls discharge directly to surface water (unnamed tributary to Scioto River, Little Beaver Creek, Big Run Creek, and the Scioto River). Two discharge to the X-6619 STP and Outfall 003 and one discharges to the X-230K South Holding Pond (Outfall 002).

DOE-PORTS Outfalls:

012 (X-2230M Holding Pond)
013 (X-2230N Holding Pond)
015 (X-624 Groundwater Treatment Facility)
608 (X-622 Groundwater Treatment Facility)
610 (X-623 Groundwater Treatment Facility)
611 (X-622T Groundwater Treatment Facility)

USEC Outfalls:

001 (X-230J7 East Holding Pond)
002 (X-230K South Holding Pond)
003 (X-6619 Sewage Treatment Plant)
004 [X-616 Chromate Treatment Facility (inactive)]
005 (X-611B Lime Sludge Lagoon)
009 (X-230L North Holding Pond)
010 (X-230J5 Northwest Holding Pond)
011 (X-230J6 Northeast Holding Pond)
602 (X-621 Coal Pile Runoff Treatment Facility)
604 (X-700 Biodenitrification Facility)
605 (X-705 Decontamination Microfiltration System)

Surface water monitoring of the Big Run Creek, East Drainage Ditch, Little Beaver Creek, North Holding Pond, unnamed southwestern drainage ditch, and West Drainage Ditch is conducted quarterly to assess the effect of the discharge of groundwater to streams (as base flow) at PORTS. This monitoring helps to support assessment monitoring at X-231B and X-701B and post-closure monitoring at X-616, X-735, and X-749. These surface monitoring locations are part of the Groundwater Monitoring Program and are not considered part of the PORTS NPDES sampling program (DOE 1999a).

3.4.2.3 Surface water quality

Both DOE and USEC monitor NPDES outfalls for radiological discharges by collecting water samples and analyzing the samples for radionuclides. Samples are analyzed for total uranium, isotopic uranium, gross alpha radiation, gross beta radiation, Technetium-99, Plutonium-239/240, Plutonium-238, Neptunium-237, and Americium-241. In 2000, total radioactivity discharged from DOE NPDES outfalls has been estimated at 4.1 mCi, and uranium discharges were estimated at 1.1 kg. Data collected by USEC and provided to DOE showed that USEC released 16.8 kg of uranium through 8 NPDES outfalls during 2000. Total radioactivity released was 31.4 mCi U and 62.5 mCi Technetium-99.

The Ohio EPA also requires monthly collection of surface water samples from the X-745C and X-745E depleted UF_6 cylinder yards. Samples are analyzed for alpha activity, beta activity, and total uranium. During 2000, alpha activity ranged from less than 0 picocurie per liter (pCi/L) to 15 pCi/L, beta activity ranged from less than 2 pCi/L to 44.7 pCi/L, total uranium ranged from less than 0 μg/L to

12 μg/L, and maximum values for specific radionuclides detected were: 16 pCi/L Technetium-99, 6 pCi/L Uranium-233/234, 0.19 pCi/L Uranium-235, 0.13 pCi/L Uranium-236, and 2.7 pCi/L Uranium-238. Samples also were analyzed for total PCBs, Americium-241, Americium-243, Neptunium-237, Plutonium-238, and Plutonium-239/240. These parameters were not detected at levels greater than the applicable detection limits.

Sampling of nonradioactive constituents is regulated under the NPDES permit. Analyses are performed in accordance with applicable regulations. This EA does not include results for nonradiological monitoring of USEC NPDES outfalls.

Results of a 1998 surface water monitoring study conducted in conjunction with groundwater assessment monitoring are as follows. No VOCs were detected at the sampling locations in Big Run Creek, Little Beaver Creek, East Drainage Ditch, North Holding Pond, or West Drainage Ditch, with the exception of small amounts of chloroform and other trihalomethanes that are common residuals in treated chlorinated drinking water. These streams received such treated water. TCE has been detected regularly within the unnamed Southwestern Drainage Ditch (sample point UND-SW01) at low levels since 1990 and was detected in 1998 at 2 to 3 μg/L. TCE was also detected downstream from this location at 2 μg/L in the second quarter of 1998. Naturally occurring Sunbury Shale chips and fines in the stream sediment contain trace concentrations of uranium, and these chips might account for the low uranium concentrations that were detected below PRGs at many of the sampling locations in 1998. Gross alpha and beta activity was also detected at several sampling locations, but the activity was below PRGs (DOE 1999a).

3.5 FLOODPLAINS AND WETLANDS

3.5.1 Floodplains

Floodplains consist of mostly level land along rivers and streams that may be submerged by floodwaters. The Flood Insurance Rate Map (FIRM) provided by the Federal Emergency Management Agency (FEMA) indicates that the 100-year floodplain extends on both sides of Little Beaver Creek upstream from the confluence with Big Beaver Creek to the rail spur located near the X-230J-9 North Environmental Sampling Station (Fig. 3.2). The 100-year floodplain ranges on either side of Little Beaver Creek from 15.24 to 60.96 m (50 to 200 ft) roughly following the 174.7-m (575-ft) topographic contour. Flooding is not a problem for the majority of the site. The highest recorded flood level of the Scioto River in the vicinity of the site was 570.0 ft AMSL (January 1913), which is approximately 100 ft below the level of most PORTS facilities. No portion of the floodplain for Big Beaver Creek is located within the PORTS boundary.

3.5.2 Wetlands

The U.S. Army Corps of Engineers (USACE) defines wetlands as "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands usually include swamps, marshes, bogs, and similar areas. In identifying a wetland, three characteristics should be met. First, there is the presence of hydrophytic vegetation that has morphological or physiological adaptations to grow, compete, or persist in anaerobic soil conditions. Second, hydric soils are present and possess characteristics that are associated with reducing soil conditions. Third, site hydrology is such that the area is inundated or

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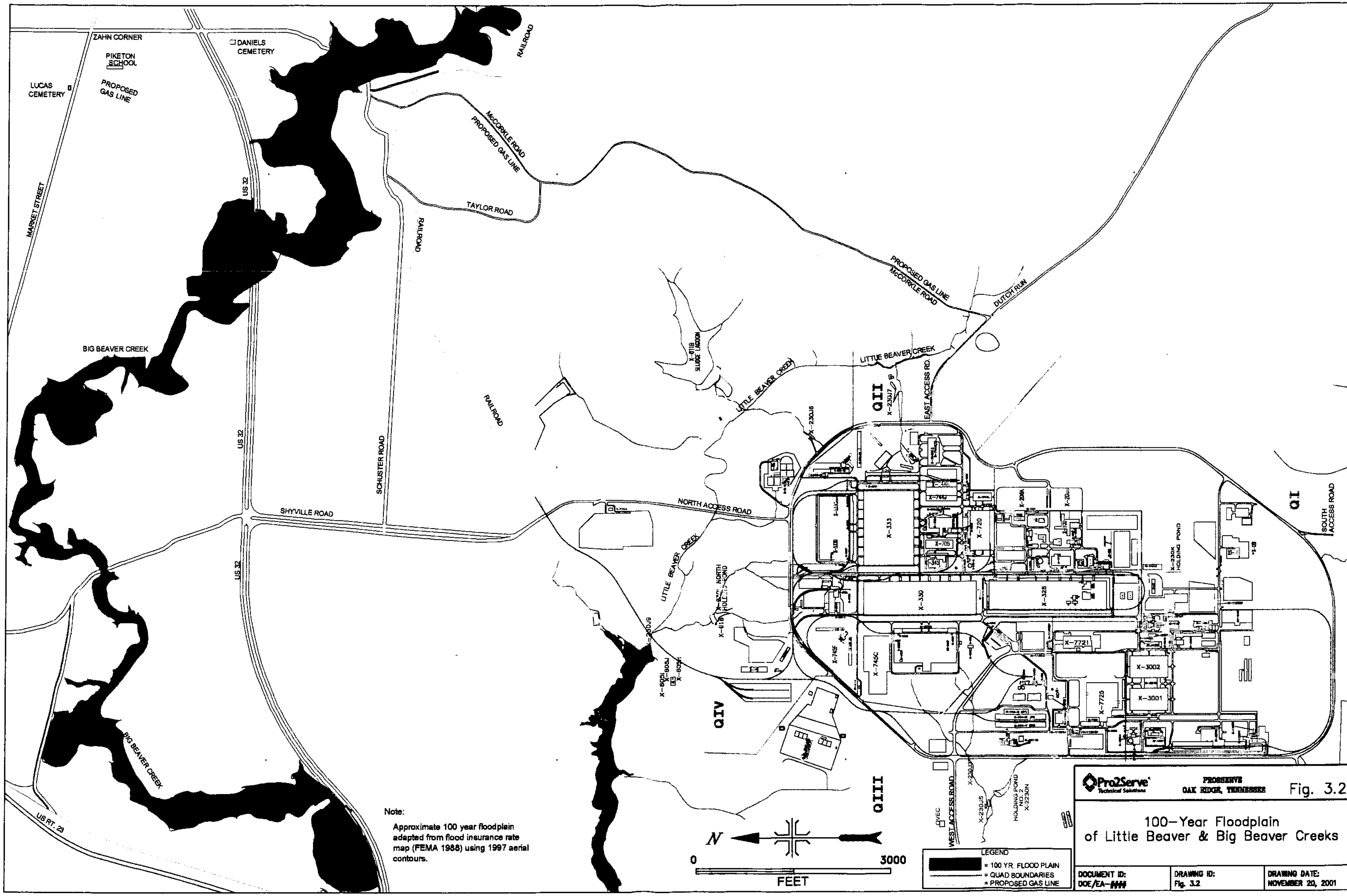

Pro2Serve Technical Solutions

PROSERVE OAK RIDGE, TENNESSEE

Fig. 3.2

100-Year Floodplain of Little Beaver & Big Beaver Creeks

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saturated to the surface at some time during the growing season of the prevalent vegetation. (USACE 1987).

PORTS contains 41 jurisdictional and 4 non-jurisdictional wetlands totaling 13.92 ha (34.36 acres) (DOE 1996b). Quadrant I has 13 jurisdictional wetlands totaling 5.22 ha (12.91 acres). Quadrant II contains three jurisdictional wetlands with a total area of 5.2 ha (12.86 acres). Quadrant III has 6 jurisdictional wetlands totaling 0.82 ha (2.02 acres), and Quadrant IV has 19 jurisdictional wetlands and 4 non-jurisdictional wetlands totaling 2.66 ha (6.58 acres). The majority of the wetlands are associated with wet fields, areas of previous disturbance, drainage ditches, or wet areas along roads and railway tracks. Table 3.2 provides information about the wetlands at PORTS. The location of all the wetlands is shown on Fig. 3.3.

3.6 ECOLOGICAL RESOURCES

3.6.1 Terrestrial Resources

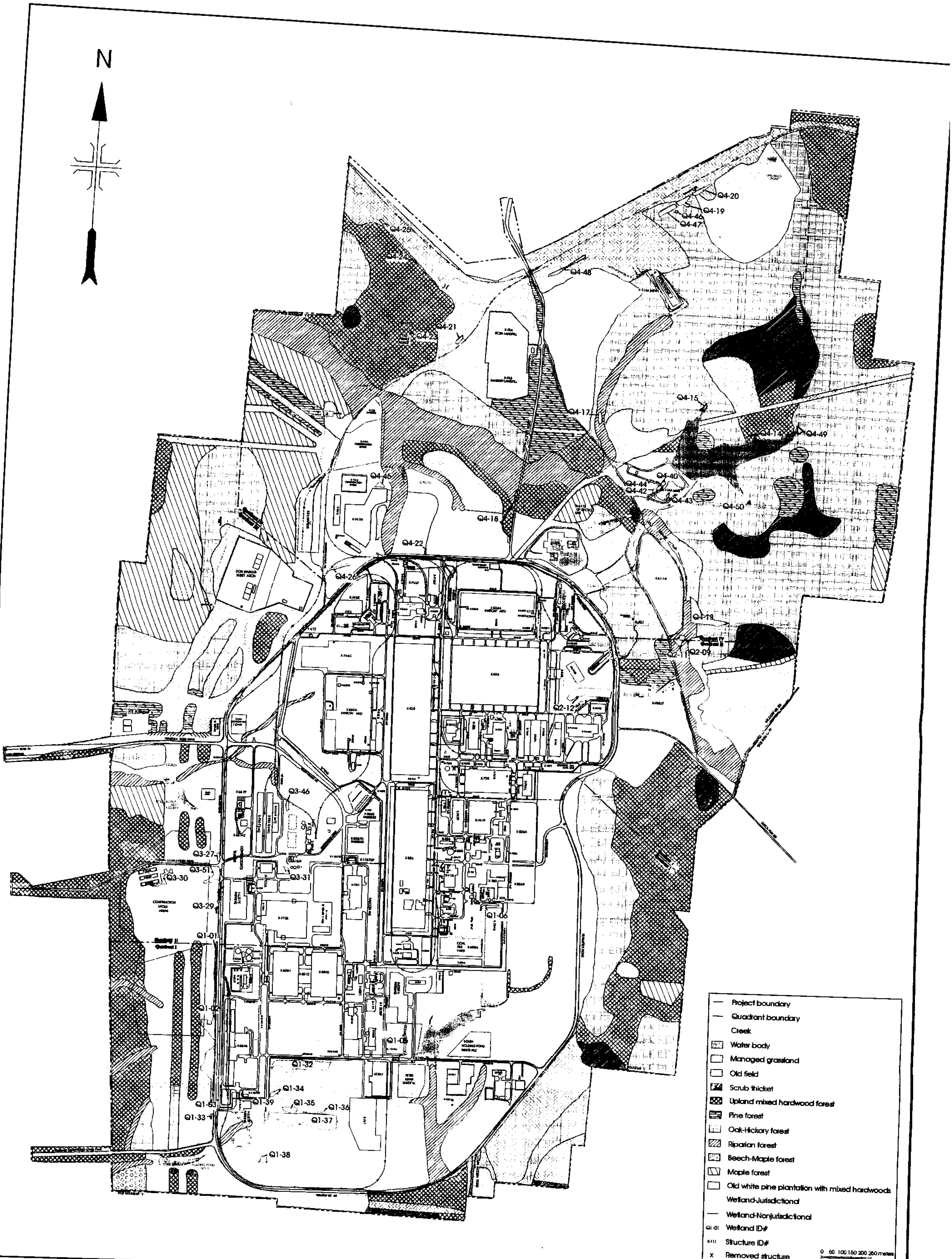
The 10 terrestrial habitat types at PORTS are as follows (DOE 1997a):

- Old field areas—Early successional stage of disturbed areas dominated by tall weeds, shade-intolerant trees, and shrubs
- Scrub thicket—Later successional stage covering old field areas dominated by dense thickets of small trees
- Managed grassland—Open areas actively maintained and dominated by grasses
- Upland mixed hardwood forest—Mesic to dry upland areas dominated by black walnut, black locust, honey locust, black cherry, and persimmon
- Pine forest—Advanced successional stage following scrub thicket. The overstory is dominated by Virginia pine
- Pine plantation—Nearly pure stands of Virginia pines
- Oak-hickory forest—Well-drained upland soils. White oak and shagbark hickory are the most dominant of the oaks and hickories
- Riparian forest—Periodically flooded, low areas associated with streams. Dominated by cottonwood, sycamore, willows, silver maple, and black walnut
- Beech-maple forest—Undisturbed areas dominated by American beech and sugar maple
- Maple forest—Dominated by sugar maple and other shade-tolerant species

Table 3.2. Wetlands at PORTS

Wetland ID #	Status	ha/acre	Location	Comments
QI-01	Jurisdictional	0.133/0.328	West Perimeter Road	
QI-02	Jurisdictional	0.436/1.077	West Perimeter Road	
QI-03	Jurisdictional	0.778/1.922	West Perimeter Road	
QI-05	Jurisdictional	0.105/0.259	X-2207 parking	Drainage ditch
QI-06	Jurisdictional	0.093/0.230	X-749A landfill	Drainage ditch
QI-32	Jurisdictional	1.292/3.189	Former GCEP site	Wet field; former GCEP site
QI-33	Jurisdictional	0.012/0.029	West Perimeter Road	
QI-34	Jurisdictional	0.109/0.269	Former GCEP site	Wet field; former GCEP site
QI-35	Jurisdictional	0.151/0.374	Former GCEP site	Wet field; former GCEP site
QI-36	Jurisdictional	0.051/0.125	Former GCEP site	Wet field; former GCEP site
QI-37	Jurisdictional	1.874/4.626	Former GCEP site	Wet field; former GCEP site
QI-38	Jurisdictional	0.103/0.254	Former GCEP site	Wet field; former GCEP site
QI-39	Jurisdictional	0.092/0.228	Former GCEP site	Wet field; former GCEP site
QII-09	Jurisdictional	4.203/10.378	Little Beaver Creek	
QII-11	Jurisdictional	0.182/0.450	X-611A	Previous disturbance
QII-12	Jurisdictional	0.821/2.028	X-701B area	RAD area
QIII-27	Jurisdictional	0.047/0.117	West Perimeter Road	
QIII-29	Jurisdictional	0.015/0.036	West Perimeter Road	
QIII-30	Jurisdictional	0.194/0.480	X-744 N, P, and Q	Previous disturbance
QIII-31	Jurisdictional	0.042/0.103	X-615	RAD area
QIII-46	Jurisdictional	0.032/0.080	X-616	Drainage ditch
QIII-51	Jurisdictional	0.486/1.201	West Perimeter Road	
QIV-13	Jurisdictional	0.949/2.343	X-611A	Old borrow area
QIV-14	Non-jurisdictional	0.005/0.012	X-611B	Sludge lagoon
QIV-15	Non-jurisdictional	0.046/0.114	X-611B	Sludge lagoon
QIV-17	Jurisdictional	0.093/0.229	Fog Road	Natural area; past disturbance
QIV-18	Jurisdictional	0.130/0.322	North access road	Drainage ditch
QIV-19	Jurisdictional	0.181/0.447	North borrow area	Drainage ditch
QIV-20	Jurisdictional	0.158/0.389	North borrow area	Drainage ditch
QIV-21	Jurisdictional	0.066/0.163	X-735 landfill	Borders railroad track
QIV-22	Jurisdictional	0.007/0.018	X-7456 cylinder yard	Drainage ditch
QIV-23	Jurisdictional	0.024/0.006	Ruby Hollow	Natural area; past disturbance
QIV-24	Jurisdictional	0.018/0.044	Ruby Hollow	Natural area
QIV-25	Jurisdictional	0.038/0.094	Ruby Hollow	Natural area; past disturbance
QIV-26	Jurisdictional	0.065/0.160	X-752 Warehouse	Man-made ditch
QIV-40	Jurisdictional	0.145/0.359	X-611B	Man-made ditch
QIV-42	Jurisdictional	0.047/0.115	X-611B	Base of dam
QIV-43	Jurisdictional	0.048/0.119	X-611B	Base of dam
QIV-44	Jurisdictional	0.068/0.167	X-611B	Base of dam
QIV-45	Jurisdictional	0.08/0.201	X-747H landfill	RAD area
QIV-46	Jurisdictional	0.016/0.040	North borrow area	Borrow area
QIV-47	Jurisdictional	0.202/0.499	North borrow area	Drainage ditch
QIV-48	Jurisdictional	0.228/0.564	North borrow area	Drainage ditch
QIV-49	Non-jurisdictional	0.058/0.142	X-611B	Sludge lagoon
QIV-50	Non-jurisdictional	0.013/0.031	X-611B	Sludge lagoon

GCEP = Gas Centrifuge Enrichment Plant.
ha = hectare.
RAD = radioactive.
Source: Wetland Survey Report for the Portsmouth Gaseous Diffusion Plant, 1996b, POEF-LMES-106.



Poster - 1 (Deacon)

Fig. 3.3

Terrestrial and aquatic habitats (including wetlands) located at PORTS.

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The habitat types covering the largest area on the reservation are managed grassland (30% of total area), oak-hickory forest (17%), and upland mixed hardwood forest (11%). The areas covered by each habitat type are listed in Table 3.3 and shown in Fig. 3.3. Several species of animals have been observed within the PORTS property boundary. A complete list of these species is presented in Appendix B and is summarized in this section.

Table 3.3. Terrestrial habitat types at PORTS

Habitat type	Approximate total area (ha/acre)	Approximate no. of communities	Percent of total area[a]
Managed grassland	446/110	Numerous[b]	30.0
Old field	170/420	10	11.4
Scrub thicket	32/79	10	2.2
Upland mixed hardwood forest	162/400	20	10.9
Pine forest	28/69	10	1.9
Oak-hickory forest	256/632	14	17.2
Riparian forest	62/153	10	4.2
Beech-maple forest	2/5	1	0.1
Maple forest	52/128	7	3.5
Old white pine plantation with mixed hardwoods	2/5	1	0.1

Source: DOE 1997a (DOE/OR/11/1668&D0).

[a]Total site area is 1486 ha (3714 acres). Approximately 252 ha (629 acres, 16.9%) of the total area are covered by buildings, parking lots and roads. The remainder of the total site area contains aquatic habitat.

[b]This habitat is present in many areas interspersed between buildings and paved areas across the plant site.

Forty-nine mammals have ranges that include PORTS. Only 28 of those have been observed on the site. The most abundant mammals include white-footed mouse (*Peromyscus leucopus*) and short-tailed shrew (*Blarina brevicauda*). Larger mammals present include white-tailed deer (*Odocoileus virginianus*), eastern cottontail rabbit (*Sylvilagus floridans*), and opossum (*Didelphis virginiania*) (DOE 1996c).

One hundred and fourteen bird species including year-round residents, winter residents, and migratory species have been observed on-site (DOE 1996c). The species include raptors [red-tailed hawk (*Buteo jamaicensis*)], water birds [mallard (*Anas platyrhychos*) and wood duck (*Aix sponsa*)], game birds [wild turkey (*Meleagris gallopauo*)], and non-game birds [nuthatches (*Sitta* sp.) and wrens (*Troglodytes* sp.)].

Eleven species of reptiles and six species of amphibians have been observed at the facility. The most common reptiles include eastern box turtle (*Terrapene c. carolina*), black rat snake (*Elaphe obsolete obsoleta*), and northern black racer (*Coluber constrictor*). The most common species of amphibians are American toad (*Bufo americanus*) and northern dusky salamander (*Desmognathus fuscus*) (DOE 1996c).

Common orders of insects found at PORTS include Homoptera (cicadas and aphids), Hymenoptera (bees, wasps, and ants), Diptera (flies), Coleoptera (beetles), and Orthoptera (grasshoppers) (Battelle 1976).

3.6.2 Aquatic Resources

Surface water aquatic resources at PORTS include creeks and drainage ditches. Little Beaver Creek and Big Run Creek provide drainage for a large portion of the facility. All aquatic resources at the facility are shown in Fig. 3.3. Sources of surface water are precipitation runoff, groundwater discharge, and effluent from plant processes. Most of the aquatic resources include populations of fish (54 species were collected around the facility), invertebrates, and periphyton. The outflow areas also are known to adversely affect the aquatic community of organisms. Some areas of ditches are devoid of aquatic insects and fish while other areas support only the most pollution-tolerant species.

In 1997, the Ohio EPA (Ohio EPA 1998) assessed Little Beaver Creek and found that non-attainment of the Warmwater Habitat (WWH) designation occurred upstream and immediately downstream from the X-230J7 effluent discharge. Partial attainment was reached 0.97 km (0.6 miles) downstream from the X-230J7 discharge, and in the lower reaches the stream fully attained WWH status. The lack of stream habitat combined with low water flow was determined to be the principal cause of the non-attainment of WWH status in the upper reaches, and not the effluent. The fish communities ranged from fair to exceptional condition in the Little Beaver Creek and ranged from good to exceptional downstream from the X-230J7 discharge. The macroinvertebrate communities ranged from poor to exceptional. Poor ratings were assigned in the upstream areas where low flow or pollution stressed the community. Downstream areas of Little Beaver Creek contained exceptional macroinvertebrate communities and included high taxa diversity and a predominance of pollution-sensitive organisms. The most abundant fish taxa were central stonerollers (*Campostoma anomalum*), creek chubs (*Semotilis atromaculatus*), and bluntnose minnows (*Pimephales notatus*).

Big Run Creek is a typical headwater stream for the area. Prior to the relocation of 304.8 m (1000 ft) of the stream channel in 1994, it contained seven species of fish dominated by creek chubs and central stonerollers (Ohio EPA 1993). Macroinvertebrates consisted of chironomids, fly larvae, mayflies, stoneflies, caddisflies, beetles, damselflies, aquatic earthworms, and planaria (ERDA 1977).

The drainage ditches have not been well studied in the past. An unnamed western tributary has three species of fish typically associated with headwaters and contains fly larvae, caddisflies, beetles, and snails (ERDA 1977). Tributaries in the northwestern and southwestern portions of the facility have not had bioassessments performed on them.

3.6.3 Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) and the Ohio Department of Natural Resources (ODNR), Division of Natural Areas and Preserves, provided information regarding threatened and endangered species at PORTS. Also, a comprehensive evaluation of the site for the presence of federal- and state-listed threatened and endangered species was conducted in 1996 (DOE 1997a). The USFWS has indicated that the Indiana bat (Myotis sodalis) is the only federally listed endangered animal species whose home range includes PORTS. Information from USFWS and ODNR identified several state-listed threatened, endangered, and special interest species within 1 mile of the facility; however, their database does not show any species within the property boundaries of the facility.

Surveys were conducted for the presence of the Indiana bat in 1994 and 1996. As part of the 1996 survey, potential summer habitat for the Indiana bat was identified in the Northwest Tributary stream corridor, the Little Beaver Creek stream corridor, and along a logging road in a wooded area to the east of the X-100 facility. Mist netting was conducted in those areas in June and again in August. Although 14 bats representing four common species were captured during the August survey, no Indiana bats were collected. The survey also indicated that most of PORTS has poor summer habitat for Indiana bats. The few woodlands that occur on the property are small, isolated, and not of sufficient maturity to provide good habitat. The exception is an area of deciduous sugar maple forest along the Northwest Tributary stream corridor, where several of the bats were collected (DOE 1997a). The Northwest Tributary begins just southwest of the Don Marquis substation and flows approximately 3200 ft before leaving the DOE property prior to its confluence with Little Beaver Creek.

The timber rattlesnake has been identified as a proposed candidate species for the Federal endangered species list. Although none have been observed at the site, PORTS is included in the range of this species. It is also listed as endangered by the State of Ohio.

Historically, isolated sightings and observations of threatened, endangered, or special interest species have occurred at the facility. An Ohio endangered raptor, sharp-shinned hawk (*Accipiter striatus*), has been observed at the site in the past (DOE 1993). One Ohio endangered plant species, Carolina yellow-eyed grass (*Xyris difformis*), and a potentially threatened species, Virginia meadow-beauty (*Rhexia virginica*), have been found at the facility (DOE 1993; DOE 1996c). The rough green snake (*Opheodrys aestivus*), listed as an Ohio special interest species, has been observed at PORTS (DOE 1996c).

3.6.4 Environmentally Sensitive Areas

There are several environmentally sensitive areas within PORTS. These include areas where Ohio endangered or threatened species have been observed and wetland areas and the floodplain of Little Beaver Creek. There are no exceptional warm water streams within the facility.

- The Northwest Tributary stream corridor is considered a sensitive area because it represents the best habitat for bats at PORTS.

- The area near the X-611B sludge lagoon should be considered a sensitive area due to the possible presence of Carolina yellow-eyed grass, which was observed at PORTS in 1994 (DOE 1996b). Confirmation of this species is necessary, as the original identification occurred while the plant was not flowering.

- The area near the X-611A lagoon is a sensitive area because of the presence of Virginia meadow-beauty (*Rhexia virginica)* adjacent to the base of the dike. Wetlands also are present in this area.

None of these environmentally sensitive areas would be affected by the proposed action. There are no state or national parks, forests, conservation areas, wild and scenic rivers, or other areas of recreational, ecological, scenic, or aesthetic importance within the immediate vicinity of PORTS. A PORTS site picnic area and two greenways have been licensed to local entities as part of community development and are in the planning stages.

The DOE Seal Township-Ruby Hollow Greenway is located on the northeastern quarter of the PORTS site; this greenway will not be impacted by the proposed action.

The DOE Scioto Township-Davis Greenway is located on the southeastern quarter of the PORTS site; the low-pressure 100-psi natural gas pipeline would be located on the western edge of the greenway property within approximately 100 ft of the center of Perimeter Road. The proposed action would pose no detrimental impact on the use of the property as a greenway.

The recreational park/picnic area is located south and east of the DOE Scioto Township-Davis Greenway, also in the southeastern quarter of the PORTS site. The site of the recreational park/picnic area and this site will not be impacted by the proposed action.

3.7 CULTURAL RESOURCES

Cultural resources are defined as any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. When these resources meet any one of the National Register Criteria for Evaluation (NRCE) (36 *CFR* Part 60.4), they may be termed historic properties and thereby are potentially eligible for inclusion in the National Register of Historic Places (NRHP).

Several draft cultural resource surveys have been prepared for DOE PORTS and will be evaluated in conjunction with the Ohio State Historic Preservation Office (SHPO) to determine properties that are eligible for inclusion in the NRHP.

3.7.1 Archaeological Resources

PORTS is located within a region where Adena and Hopewell Indian mounds have existed. Additionally, several historic Native American Indian tribes are known to have had villages nearby.

Two preliminary Phase I archaeological surveys (Dobson-Brown et al. 1996; Schweikart et al. 1997) have been completed at PORTS. The combined surveys covered 836 ha (2066 acres) in Quadrants I through IV. There are few prehistoric archaeological resources at PORTS. Whether this is indicative of the local prehistoric upland settlement pattern or is a consequence of the extensive land disturbance associated with PORTS is not known. In contrast, historic archaeological resources in PORTS are relatively abundant, conspicuous, and undisturbed due to the nature and development of the facility.

Dobson-Brown et al. (1996) developed a predictive model of archaeological resource locations at PORTS based on variations in modern plant communities, topography, and soils, and on the location of previously identified archaeological resources in a 6.5-km (4-mi.) literature review study area radius around the facility.

Survey methods in Quadrants I and II included visual inspection, surface collection, and hand excavation of shallow, <13 cm (<5 in.), shovel test pits. Similar shovel test pits inside the Perimeter Road area did not identify archaeological resources and indicated that this area has been highly disturbed.

Survey methods in Quadrants III and IV consisted of visual inspection, surface collection, hand-excavated shovel tests to 30 cm (12 in.) in depth in high-probability areas lacking significant disturbance and <15% slope. Additionally, hand-excavated deep shovel tests (>30 cm or 12 in.) were accompanied by 2-cm (0.75-in.)-diameter hand-coring in three areas in Quadrant IV along Little Beaver Creek. Portions of Quadrants I and II that were not investigated during the preliminary Phase I archaeological survey were also investigated by shallow shovel tests.

The combined Phase I archaeological surveys identified 38 archaeological resources (Tables C.1, C.2, and C.3) (see Appendix C). Nine of the resources contain prehistoric components. Five are identified as prehistoric isolated finds. Two are identified as prehistoric lithic scatters. Two contain prehistoric and historic components: a prehistoric isolated find in an historic cemetery and a prehistoric lithic scatter and historic farmstead. These sites are located in Quadrants I, II, and IV. No archaeological resources have been identified in Quadrant III. Thirty of the archaeological resources are associated with historic-era properties located within PORTS. Fifteen are remnants of historic farmsteads. Seven are scatters of historic artifacts or open refuse dumps. Two are isolated finds of historic artifacts. Four are remnants of PORTS structures. Two are historic cemeteries. One of the historic cemeteries has an associated chapel and remnant of a PORTS observation tower.

The draft cultural resource report (Schweikart et al. 1977) determined that 22 of the archaeological resources do not meet the NRCE (Table C.1) (see Appendix C). Insufficient data were collected at the remaining 14 archaeological components and two historic-era cemeteries, one of which (33 Pk 189; PIK-206-9) includes an associated historic archaeological component, to determine whether they meet the NRCE (Tables C.2 and C.3) (see Appendix C).

3.7.2 Architectural Historic Resources

Two architectural historic surveys have also been completed at PORTS (Dobson-Brown et al. 1996; Coleman et al. 1997). The combined surveys covered 1501 ha (3708 acres) and identified several structures that may have historical significance at PORTS (Table C.4) (see Appendix C).

A draft historic context for PORTS has also been prepared. This historic context is broken into four development periods for PORTS: Development Period 1 which includes pre-PORTS facilities, Development Period 2 which includes original PORTS facilities, Development Period 3 which includes PORTS facility additions, and Development Period 4 which includes GCEP facilities. In the draft architectural survey report (Coleman et. al. 1997), recommendations were made concerning which buildings and structures were considered contributing and noncontributing resources to the PORTS historic property. DOE will evaluate these recommendations in conjunction with the Ohio State Historic Preservation Office (SHPO) to determine which buildings and structures are considered historic properties under the National Historic Preservation Act (NHPA) and whether any of the properties are eligible for inclusion in the NRHP.

3.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The region of influence (ROI) for the PORTS analysis includes Jackson, Pike, Ross, and Scioto Counties, Ohio. The ROI includes the city population centers of Portsmouth, Chillicothe, and Jackson, as well as several rural villages such as Piketon, Wakefield, and Jasper (Fig. 3.4.).

3.8.1 Demographic Characteristics

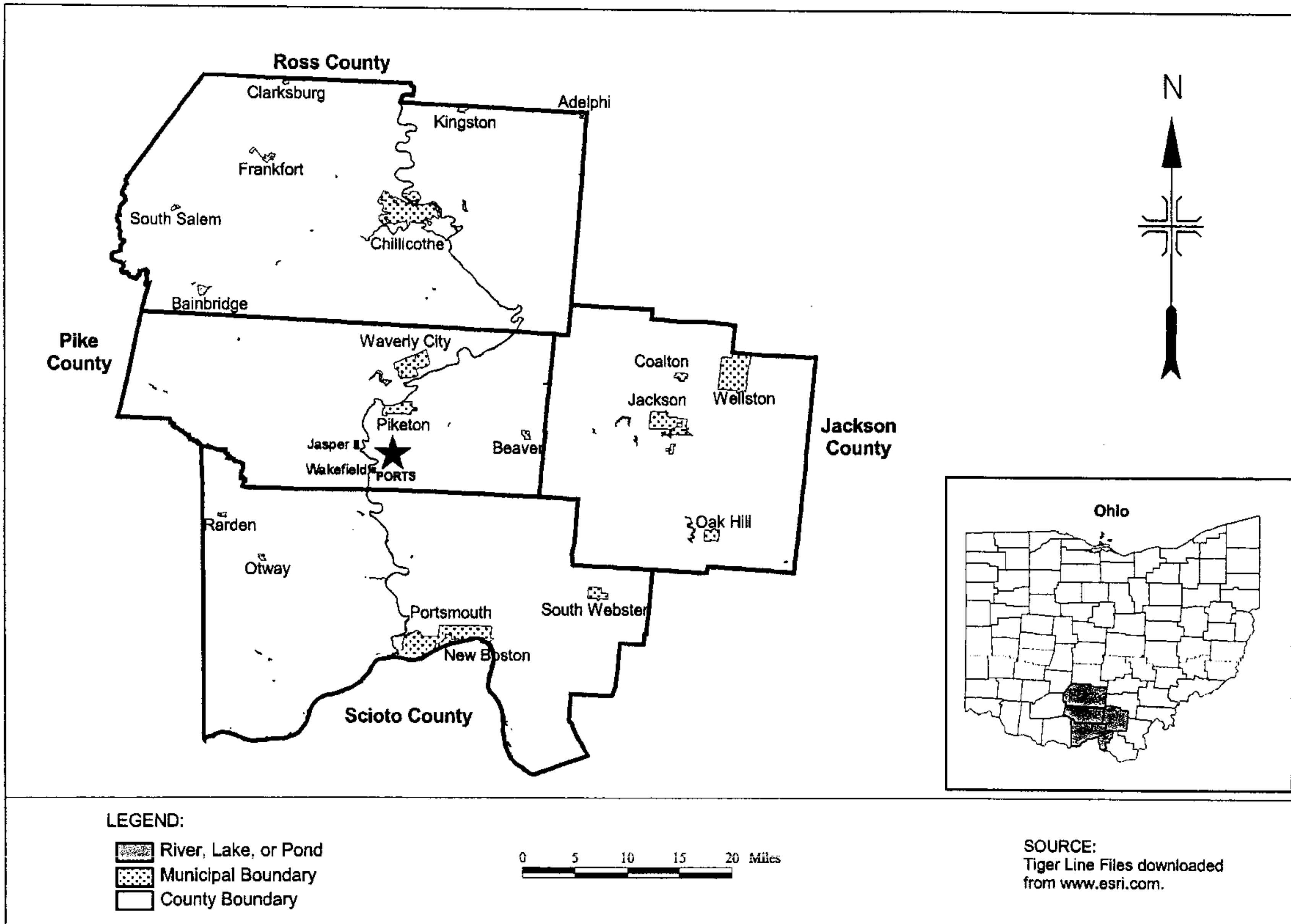
3.8.1.1 Population

Population trends and projections for each of the counties in the ROI are presented in Table 3.4. Of the four counties, Scioto and Ross Counties have the largest populations, accounting for 37% and 35%, respectively, of the region's 1997 population. Jackson County accounts for 15%, and Pike County for the remaining 13%. The Ohio Department of Development (ODOD) projects that the population in the region will grow very slowly, increasing by less than 7% between 1997 and 2010 (ODOD 1999).

Table 3.4. PORTS ROI regional population trends and projections

County	1990	1997	2000	2010
Jackson	30,238	32,455	32,900	35,000
Pike	24,362	27,530	27,140	29,380
Ross	69,455	75,168	74,800	81,700
Scioto	80,385	80,744	82,500	84,700
Region	204,440	215,897	217,340	230,780
State	10,861,801	11,237,752	11,288,760	11,738,930

Sources: Bureau of Economic Analysis, 1999; ODOD, 1999.



Pro2Serve | **Fig. 3.4** | Region of influence for PORTS. | DOCUMENT ID: DOE/EA-1459 | DRAWING ID: Fig3-4a O2EA.cdr | DRAWING DATE: May 18, 2001

3.8.1.2 Minority and economically disadvantaged populations

The distribution of minority and economically disadvantaged populations was studied to address environmental justice concerns. Table 3.5 presents the distribution of minority populations by county in the four-county ROI. For the purposes of this analysis, a minority population consists of any area in which minority representation is greater than the national average of 24.2%. Minorities include individuals classified by the U.S. Bureau of the Census as Negro/Black/African-American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, or Aleut. Since Hispanics may be of any race, nonwhite Hispanics are included only in the Hispanic category, and not under their respective minority racial classifications. In all four counties, minority populations are smaller than the national average, ranging from a high of 8.9% in Ross County to a low of 1.2% in Jackson County (ODOD 1999).

Table 3.5. PORTS ROI distribution of minority populations, 1998

	Jackson		Pike		Ross		Scioto	
Race/ethnic group	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
White	32,159	98.4	27,185	97.4	69,246	91.2	77,647	96.2
Black	270	0.8	433	1.6	5618	7.4	2079	2.6
Asian/Pacific Islander	74	0.2	74	0.3	420	0.5	200	0.3
American Indian	60	0.2	83	0.3	189	0.2	429	0.5
Hispanic (any race)	129	0.4	112	0.4	492	0.7	337	0.4
Total	32,692	100.0	27,887	100.0	75,965	100.0	80,692	100.0

Source: ODOD, 1999.

Since any adverse health or environmental effects are likely to fall most heavily on the individuals nearest PORTS, it is also important to examine the populations in the closest census tracts. Fig. 3.5 illustrates the distribution of minority populations in the census tracts that immediately surround the PORTS plant. As of the 1990 Census, none of the tracts closest to the site had minority representation greater than the national average of 24.2% (Bureau of the Census 1990a). In Pike County, tract 9522 contained the largest proportion of minority residents at 4.9%. Only one census tract within the ROI includes a minority population; minorities represent 26.1% of the population in tract 9937 in Scioto County (not shown in Fig. 3.5). This tract is near the center of the city of Portsmouth, approximately 37 km (23 miles) south of PORTS.

Table 3.6 presents the proportion of individuals with income below the poverty level, by county, in the four-county ROI. Figure 3.6 shows the location of low-income populations for the same area. In this analysis, a low-income population includes any census tract in which the percentage of persons with income below the poverty level is greater than the national average of 13.1% (Bureau of the Census 1990b). The Ohio average in 1990 was 12.5%. Nearly all (41 out of 48) of the census tracts in the four-county area qualify as low-income populations (Bureau of the Census 2000). The percent of persons below the poverty level ranges as high as 51.0% for tract 9936 in Scioto County (not shown in Fig. 3.6). In Pike County, the proportion ranges from 10.8% in tract 9524 to 33.9% in tract 9527.

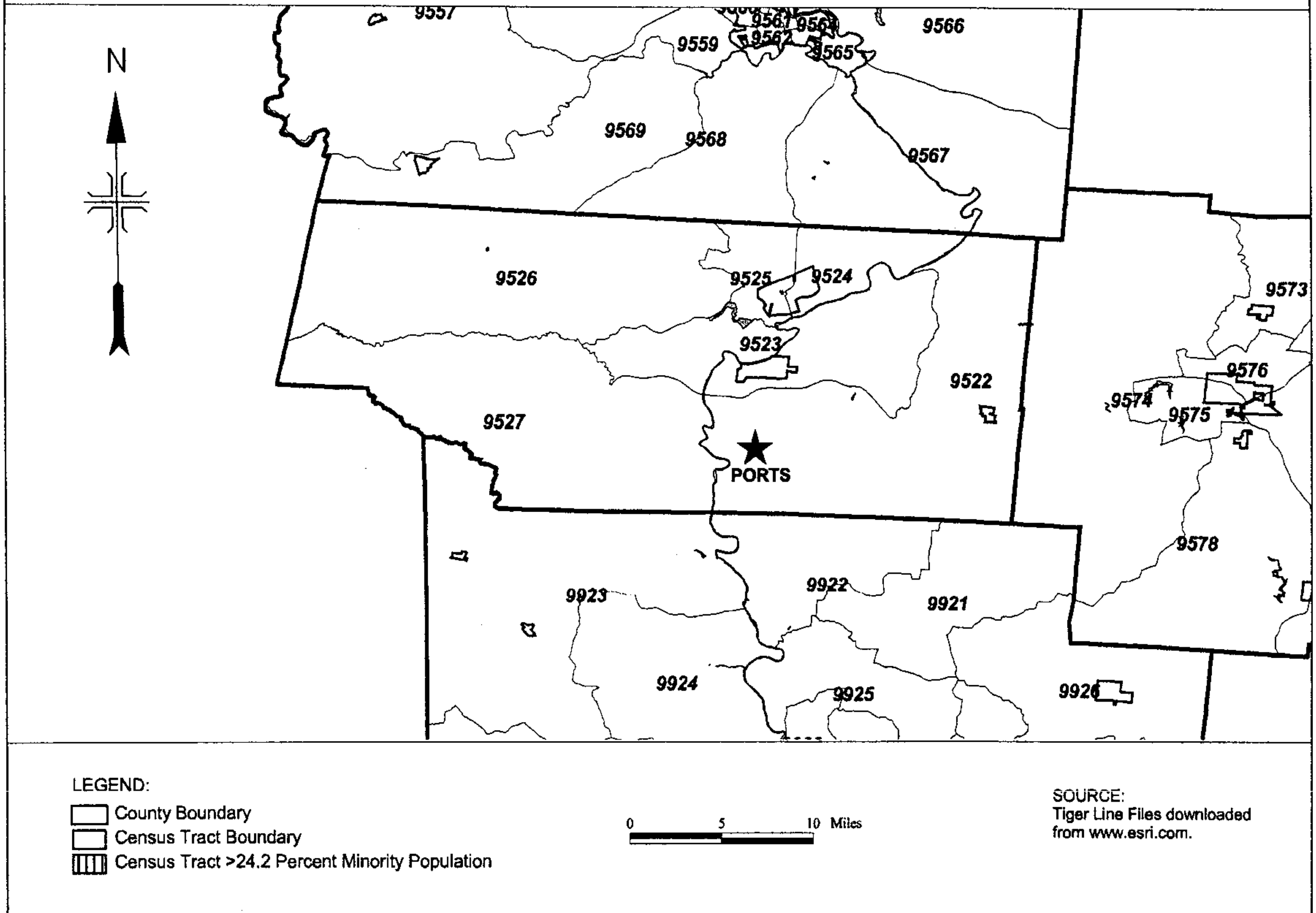


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Fig. 3.5 Census tracts with minority population proportions greater than the national average of 24.2%.

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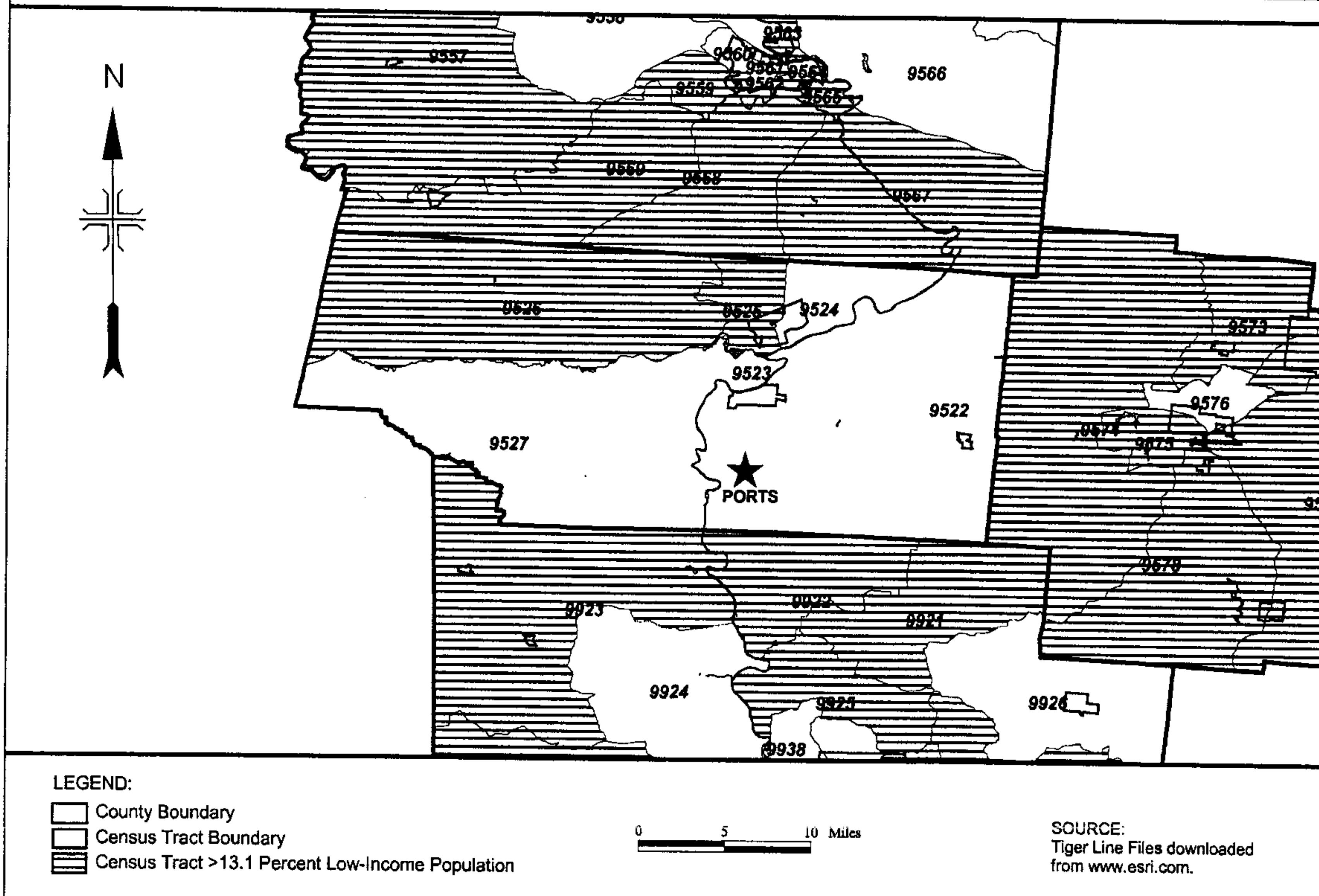

Pro2Serve **Fig. 3.6** Census tracts with low-income population proportions greater than the national average of 13.1%.

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Table 3.6. Proportion of individuals with income below poverty level: PORTS ROI, 1989 and 1995

Area	Percent 1989	Percent 1995
Jackson County	24.2	17.5
Pike County	26.6	19.5
Ross County	17.7	15.1
Scioto County	25.8	21.4
State of Ohio	12.5	12.5
United States	13.1	13.1

Source: ODOD, 1999; Bureau of the Census. 1990b.

3.8.2 Employment

Regional employment data for 1992 and 1997 are summarized in Table 3.7. While total employment grew more than 16% during the 5-year period, unemployment rates within the region remained high. As Table 3.8 shows, the 1999 average unemployment rate for the ROI was 7.0%, compared to a statewide average of only 4.3%. Unemployment rates for individual counties ranged from 8.6% in Pike County to 5.2% in Ross County (Bureau of Labor Market Information 2000). Data for previous years show a persistent pattern of high unemployment rates throughout the region.

Table 3.7. PORTS ROI employment, 1992 and 1997

County	1992	1997	Percent change
Jackson	12,240	14,017	14.52
Pike	10,506	13,930	32.59
Ross	29,428	33,944	15.35
Scioto	28,802	32,218	11.86
Region	80,976	94,109	16.22
Ohio	5,906,639	6,596,769	11.68

Source: Bureau of Economic Analysis, 1999.

Table 3.8. PORTS ROI annual average unemployment, 1999

County	Employed	Unemployed	Total	Unemployment rate (%)
Jackson	13,600	1,000	14,600	6.8
Pike	10,600	1,000	11,600	8.6
Ross	32,900	1,800	34,700	5.2
Scioto	30,100	2,800	32,900	8.5
Total	87,200	6,600	93,800	7.0
Ohio	5,503,000	246,000	5,749,000	4.3

Source: Bureau of Labor Market Information, 2000.

In 1997, 2340 (91%) of the 2550 DOE-related workers lived in the four-county impact region (SODI 1997). These workers represented about 2.6% of the total ROI employment shown in Table 3.7. Table 3.9 shows the distribution of DOE-related employment across the ROI counties for that year. Scioto County held the largest share of the region's DOE-related employment with 51%, followed by Pike County with 23% and Ross County with 15%. Jackson County accounted for the remaining 10%.

Table 3.9. Distribution of DOE-related employment in ROI, 1997

County	1997 Employment	Percent
Jackson	244	10
Pike	544	23
Ross	362	15
Scioto	1190	51
Region	2340	99

Source: SODI, 1997.

Currently the total site employment at PORTS is approximately 1868. USEC employs about 1415 people while DOE, BJC, and various subcontractors employ approximately 644 people.

3.8.3 Income

Between 1992 and 1997, total regional income grew by 27% from approximately $2.9 billion to nearly $3.7 billion (Bureau of Economic Analysis 1999). Per capita income data for the region and the state are shown in Table 3.10. Per capita income in all four counties was well below the state average in both 1992 and 1997, continuing a long established trend. From 1992 to 1997, per capita incomes in the relevant counties grew between 19 and 25%, compared to a statewide increase of 24%. In 1997, it was estimated that PORTS accounted (directly and indirectly) for about $185 million of that income, about 5% of the total. The share of wages and salaries in individual counties ranged from 2.4% in Ross County to 15.2% in Pike County (Henderson 1997).

Table 3.10. Measures of per capita income for the PORTS ROI

Area	Per capita income 1992 ($)	Per capita income 1997 ($)	Percent increase
Jackson County	13,245	16,392	24
Pike County	13,292	15,783	19
Ross County	14,896	17,900	20
Scioto County	13,422	16,824	25
State of Ohio	19,482	24,163	24

Source: Bureau of Economic Analysis, 1999.

3.8.4 Housing

In 1990 vacancy rates in the region ranged between a low of 7% in Ross County to a high of 10% in Jackson County (Bureau of the Census 2000). Among all occupied housing units in the region, approximately 70% were owner occupied. The median home value was similar in all four counties, ranging between $37,000 and $49,600. Rents ranged from $281 to $317 across the ROI (Table 3.11).

Table 3.11. Housing summary for the PORTS ROI, 1990, by county

	Jackson County		Pike County		Ross County		Scioto County	
	Number	%	Number	%	Number	%	Number	%
Total housing units	12,452	100	9,722	100	26,173	100	32,408	100
Occupied	11,260	90	8,805	91	24,325	93	29,786	92
Vacant	1,192	10	917	9	1848	7	2,622	8
Median home value	$38,700	NA	$42,600	NA	$49,600	NA	$37,000	NA
Gross rent	$283	NA	$297	NA	$317	NA	$281	NA

NA = Not applicable

Source: U.S. Bureau of the Census, 2000; U.S. Bureau of the Census, 1990a.

3.8.5 Education

Summary figures for the school districts within the four-county ROI are shown in Table 3.12. The highest per-student expenditures occur in Scioto County, which spent an average of $5849 per student during the 1997 and 1998 school year (ODOD 1999).

Table 3.12. Public school statistics in the PORTS ROI, 1997 and 1998 school year

County	Number of Schools	Student enrollment[a]	Teachers[a]	Teacher/student Ratio	Per-student Expenditures
Jackson	17	6,020	347	1:17	$5,082
Pike	13	5,861	320	1:18	$5,385
Ross	30	12,444	691	1:18	$5,544
Scioto	37	14,549	923	1:16	$5,849

[a]Full-time equivalent figures, public schools only.
Source: ODOD, 1999.

3.8.6 Health Care

There are three general hospitals currently serving the region. Average statistics for the hospitals indicate that there are approximately 442 routine-care hospital beds in the region, about 53% of which are available on any given day. This capacity is considered adequate to serve the health needs of the local population (The American Hospital Directory 1999).

3.8.7 Police and Fire Protection

The Protective Forces at PORTS provide physical security services at the site. However, the Pike County Sheriff provides limited patrols of Perimeter Road. USEC and DOE both have mutual aid agreements for fire protection, emergency squad, and medical services, primarily with Scioto Township and Seal Township. The Seal Township fire department plans to add a second fire station to better protect the nearby Zahn's Corner Industrial Park. Exercises/drills involving all area protective forces are conducted annually.

3.8.8 Fiscal Characteristics

The State of Ohio imposes an income tax, and the state constitution requires that at least 50% of the income tax collected from individuals be returned to the county of origin. Transfers back to the county are distributed as follows: 4.2% to the local government fund, 0.6% to the local government revenue assistance fund, 5.7% to the library and local government support fund, and 89.5% to the general revenue fund of the county. Ohio law allows the imposition of a local sales tax on retail sales, the rental of tangible personal property, and selected services. The local permissive sales tax is 1.5% in Ross County, and 1.0% in each of the other three counties. Intergovernmental transfers back to the county in which the tax is collected are distributed as follows: 4.2% to the local government fund and 0.6% to the local government revenue assistance fund.

There is also an optional tangible personal property tax on machinery, equipment, and inventories. Revenue is distributed to the counties, municipalities, townships, school districts, and special districts according to the taxable values and total mileage levied by each. For the state as a whole, school districts receive roughly 70% of the total tangible personal property tax collected (Henderson 1997).

In 1997, Henderson estimated that activities at PORTS and wages paid to its employees accounted for $3.2 million in tax revenues returned to the region, including $2 million from income taxes and $1.2 million from sales taxes (Henderson 1997).

3.9 INFRASTRUCTURE AND SUPPORT SERVICES

3.9.1 Transportation

PORTS is served by Southern Ohio's two major highways: U.S. Route 23 and Ohio State Route 32 (Fig. 1.1). These highways are located within 1.6 km (1 mile) of the site. Access is by the Main Access Road, a four-lane interchange with U.S. Route 23, and the North Access Road, two lanes transitioning to four lanes with an at-grade interchange with Ohio State Route 32. These access routes easily accommodate PORTS traffic flow. The site is 5.6 km (3.5 miles) from the intersection of the U.S. Route 23 and 32,159d Ohio State Route 32 interchange. Both routes are four lanes with U.S. Route 23 traversing north–south and Ohio State Route 32 traversing east–west. Two other access routes also serve the site. The East Access Road is a two-lane county road that disperses traffic to a county road network east and southeast of PORTS. Access to Ohio State Route 32 is also available by this network. South Access Road is also a two-lane road that disperses traffic to the south and southeast. South Access Road also intersects U.S. Route 23 south of the site. Approximately 113 km (70 miles) north of the site, U.S. Route 23 intersects I-270, I-70, and I-71. Trucks also may access I-64 approximately 32.2 km (20 miles) southeast of Portsmouth.

North Access Road has a daily traffic load of approximately 2383 vehicles. East Access Road has a daily traffic load of 802 vehicles. South Access Road has a daily traffic load of 1579 vehicles. The Main Access Road has a daily traffic load of 592 vehicles. (Traffic in both directions is included in these values.) These roads are congested during shift change; however, traffic flows at posted speed limits and a projected 40% increase in vehicles are feasible without staggering shifts or upgrades to roads. These data were provided by the Pike County Engineer's office from a 1999 traffic study. Load limits on these routes are controlled by the Ohio Revised Code at 85,000-lb gross vehicle weight. Special overload permitting is available.

U.S. Route 23 has an average daily traffic volume of 13,990 vehicles. Ohio State Route 32 has an average daily volume of 7420 vehicles (traffic in both directions is included in these values). U.S. Route 23 is at 60% of design capacity with Ohio State Route 32 at 40% of design capacity. The Ohio Department of Transportation supplied this data from a 1999 traffic study. Load limits on these routes is controlled by the Ohio Revised Code at 85,000-lb gross vehicle weight. Special overload permitting is available.

The PORTS road system is in generally good condition due to frequent road repaving projects. Except during shift changes, traffic levels on the site access roads and Perimeter Road are low. Peak traffic flows occur at shift changes and the principal traffic problem areas during peak morning/afternoon traffic are at locations where parking lot access roads meet the Perimeter Road. The site has 12 parking lots varying in capacity from approximately 50 to 800 vehicles. Total parking capacity is for approximately 4400 vehicles.

PORTS has excellent rail access, and several track configurations are possible within the site. The Norfolk Southern rail line is connected to the CSX main rail system via a rail spur entering the northern portion of the site. The on-site system primarily is used for the movement of large uranium hexafluoride (UF_6) cylinders on flatcars. Primary tracks that handle UF_6 cylinder traffic are maintained in good condition by USEC. The secondary tracks within the site receive minimal attention. The GCEP area is also connected to the existing rail configuration. Track in the vicinity of Piketon, Ohio, allows a maximum speed of 96.6 km/h (60 mph). The CSX system also provides access to other rail carriers.

PORTS can be served by barge transportation via the Ohio River at the ports of Wheelersburg, Portsmouth, and New Boston. The Portsmouth barge terminal bulk materials handling facility is available for bulk materials and heavy unit loads. All heavy unit loading is by mobile crane or barge-mounted crane at an open air terminal. The Ohio River provides barge access to the Gulf of Mexico via the Mississippi River or the Tennessee–Tombigbee Waterway. Travel time to New Orleans is 14 to 16 d; to St. Louis, 7 to 9 d; and to Pittsburgh, 3 to 4 d. The U.S. Army Corp of Engineers (USACE) maintains the Ohio River at a minimum channel width of 243.8 m (800 ft) and a depth of 2.74 m (9 ft).

PORTS is relatively isolated from commercial air service. There are 14 major carriers that provide 300 flights per day to 89 cities serving the Greater Cincinnati International Airport, which is 160.9 km (100 miles) to the west. The Port of Columbus International Airport (160.9 km or 100 miles north) is served by 17 airlines providing 250 flights daily. The Tri-State Airport (88.5 km or 55 miles southeast), Huntington, West Virginia, is served by 4 airlines and 18 flights per day. The Portsmouth Regional Airport, serving private and charter aircraft is 30.58 km (19 miles) southeast, near Minford, Ohio. The Pike County Airport, located near Piketon, is a small facility for private planes. The Pike County Aviation Authority has proposed a capital improvement program to improve and enhance airport services.

3.9.2 Utilities

3.9.2.1 Electricity and natural gas

PORTS is supplied electricity by the Ohio Valley Electric Corporation (OVEC) under a long-term contract that ends in 2003. OVEC operates two coal-fired power plants (Kyger Creek and Clifty Falls on the Ohio River) that were built for and dedicated to serving PORTS. According to the DOE-USEC Lease Agreement, DOE continues to administer the power contracts that supply electric service to PORTS. USEC pays DOE for purchased power, which in turn pays the power suppliers who are under an existing contract.

There are four switchyards on the site. The Don Marquis Substation, which covers approximately 10.52 ha (26 acres) on the crest of a hill northwest of Perimeter Road, is a high-voltage station operated and maintained by the OVEC. High-voltage electrical power (345 kV) is received from overhead power lines at the X-533 and X-530 switchyards. High-voltage oil circuit breakers and gas circuit breakers provide line switching capability and fault protection, and large oil-filled transformers step down the power to 13.8 kV. Air circuit breakers at the X-533 and X-530 switch houses provide protection and control for the numerous 13.8-kV distribution feeders leading to the GDP process buildings, auxiliary buildings, and substations. Construction in the GCEP area included additional 345-kV circuit breakers in the northern section of the X-530 switchyard. The newer high-voltage breakers and existing X-530 breakers feed 345 kV to the X-5000 switchyard through oil-filled 345-kV underground feeder cables. The switching arrangement provides a highly reliable source of power for GCEP. At X-5000, oil-filled 345/13.8-kV transformers feed power to the 13.8-kV air circuit breakers in the X-5000 switch house that control and protect the distribution circuits serving the GCEP area facilities.

The various high-voltage overhead power lines connecting Don Marquis, X-530, and X-533 with each other and with the external power grid are owned and maintained by OVEC. The underground high-voltage system of the underground 345-kV feeders from X-530 to X-5000 are owned by DOE and leased to USEC.

Power is distributed from X-533 to X-333 and from X-530 to X-330 through 13.8-kV distribution cables. Some cables run through underground duct banks, and some are supported by aboveground cable trays. The feeder cables from X-530 to X-326 are all located in underground duct banks. Most of the major GDP facilities receive 13.8-kV power through underground duct banks. A 13.8-kV overhead power system supported by wooden poles provides power to the well fields, sanitary landfill, X-611 water treatment plant, several warehouses, and several other facilities. A 2400-V overhead system provides power for street lighting and security fence lighting.

Natural gas is not currently provided at the plant site although a project is currently underway to construct a natural gas pipeline to the site which is projected to be complete in 2002. This line is intended to primarily feed newly installed hot water boilers installed in the X-3002 Building. These boilers were installed to replace a portion of the heat source (Recirculating Heating Water or RHW) lost when the gaseous diffusion equipment was placed in cold standby. Small amounts of fuel oil are used. Several outlying buildings are not supplied by the steam or the X-3002 boiler systems. These buildings are space heated with fuel oil.

3.9.2.2 Steam distribution system

Steam is used in gaseous diffusion operations to vaporize UF_6, obtain UF_6 samples from cylinders, maintain process temperatures, clean equipment, heat sanitary water, and provide heat for process and support operations. During the fall and winter months, some steam also is used for space heating.

Steam is generated at the X-600 Steam Plant, which contains three coal-fired boilers and electrostatic precipitators, each capable of providing steam at 56,699 kg/h (125,000 lb/h) at 125 psi. The steam plant contains the normal support equipment for boiler operation such as coal and ash handling equipment and boiler feedwater treatment equipment. Coal is stored in the adjacent X-600A Coal Pile Yard. All runoff from the coal yard and wastewater effluents from the steam plant are treated for pH adjustment and heavy metal removal at the X-621 Coal Pile Runoff Treatment Facility. Treated effluent flows into the South Holding Pond. Sludge generated at X-621 is buried in the X-735 Landfill. The coal supplier hauls coal ash off-site under a contractual agreement.

Steam is distributed to most major GDP facilities through aboveground insulated pipes. Parallel piping is provided to return condensate to the X-600. Steam usage within the GCEP area is minimal. Steam and condensate return piping in this area is aboveground with a single 15.24-cm (6-in.) supply line tapped into both the east and west supply headers at the X-600.

3.9.2.3 Water systems

PORTS requires a reliable supply of large amounts of water for process cooling, fire protection, and sanitary use. During plant construction, the X-605G Well Field and the X-605H Booster Station were installed to supply water for construction and for subsequent sanitary consumption. From plant startup in 1955 until 1965, water was routinely taken from the Scioto River at the X-608 Pumphouse, 6.44 km (4 miles) northwest of the site, and transported through a single 120-cm (48-in.) reinforced concrete pipeline to the site.

Additional well fields were constructed to supply high-quality groundwater as a substitute for the poorer quality river water. However, the capability of pumping river water was retained for emergency use. The X-608A Well Field entered service in 1965, and the X-608B Well Field followed in 1975. Both are adjacent to the X-608 Pumphouse. Water flows from these well fields to the X-611 Water Treatment Plant on the site through the 120-cm (48-in.) concrete pipeline. Water from the original well field, X-605G, flows through a 25-cm (10-in.) plastic tie line into the 120-cm (48-in.) line.

The X-605 and X-608 well fields contain 19 wells with a total pumping capacity of almost 114 million L/d (30 MGD). However, because of aquifer condition, periodic silting and encrustation of the wells, as well as normal maintenance outages, their combined reliable pumping capacity is between 57 and 66.5 million L/d (15 and 17.5 MGD).

The X-6609 Well Field, constructed to support the GCEP, is composed of 12 wells with a design capacity of 32.68 million L/d (8.6 MGD). The X-6609 raw water supply is carried to the X-611 Water Treatment Plant through a 75-cm (30-in.) line. Water from X-605 flows to X-611 through a tie line into the 75-cm (30-in.) line from X-6609. At X-611, the water is treated with lime to remove a major portion of its carbonate hardness and a polymer for coagulation of precipitated solids. Following this softening process, treated water flows directly into the basins of the GDP cooling towers to "make-up" for evaporation and blowdown losses from the RCW system. The system, which consists of seven cooling towers, three pumphouses, and supply and return headers paralleling the three process buildings, is used to remove excess heat from the diffusion process.

Within the GCEP area, the principal elements of the Cooling Tower Water System consist of a pumphouse, cooling tower, and distribution piping. The system was designed to remove heat from the closed-loop Machine Cooling Water Systems and from air conditioning condensers in various facilities during the time the diffusion machinery was producing waste heat.

Following the softening process at the X-611 Water Treatment Plant, a portion of the water receives additional treatment for use as sanitary water within the facility. At X-611, the water is chlorinated, the pH is adjusted, and the water is treated with a phosphate compound for corrosion control. Residual suspended solids and bacteria are removed in the X-611C Filter House, which contains four sand filters having a combined rated capacity of approximately 15.2 million L/d (4 MGD).

At the X-611C Filter House, pumps discharge filtered water into the sanitary water distribution piping system. The X-612 Elevated Water Tank has a 950,000-L (250,000-gal) capacity. X-612 is used to maintain a stable pressure for the system (approximately 85 psi).

The fire protection sprinkler systems for all GDP facilities, except the three process buildings and their respective cooling towers, are fed from the sanitary water system. There are separate piping systems within each building for sanitary purposes and fire protection. Fire hydrants throughout the site feed directly off the sanitary water distribution piping.

The primary supply of sanitary water for the GCEP area is directly from X-611 through a pipeline that parallels Perimeter Road to the X-6644 Sanitary and Firewater Pumphouse. The X-6613 Sanitary Water Storage Tank, one of three 7.6-million-L (2-million-gal) concrete tanks, is used for buffer capacity. Booster pumps within X-6644 supply sanitary water to the GCEP area facilities and to the GDP area through several connections with the GCEP piping system.

A separate high-pressure firewater distribution system for the sprinkler systems in the three GDP process buildings and their respective cooling towers was constructed in 1959. The system is fed from the RCW make-up water line leading from X-611 and into the X-640-1 Firewater Pumphouse. Pumps within X-640-1 are used to maintain an appropriate water level in the X-640-2 Elevated Storage Tank, which has a capacity of 11.14 million L (300,000 gal). The tank has a height of 91.44 m (300 ft), which maintains the system pressure at approximately 125 psi.

The high-pressure firewater system was extended to provide fire hydrant and sprinkler system feed water for the GCEP area. Sanitary water flowing from X-611 to the X-6644 sanitary and firewater pumphouse can be valved to two firewater storage tanks that provide 15.2 million L (4 million gal) of backup capacity. Booster pumps within X-6644 feed water into the firewater distribution piping system throughout the newer facilities. Cross-connections also exist with the GDP high-pressure firewater piping around X-326. The GDP/GCEP area high-pressure firewater system is considered one system with each site serving as a backup to the other.

3.9.2.4 Wastewater treatment

The PORTS X-6619 Sewage Treatment Plant (STP) is located in Quadrant III. The plant was built in 1980 and became operational in 1981. It is comprised of four reinforced concrete buildings (screen building, sludge pumping building, filter building, and chlorine building), totaling approximately 1524 m^2 (5000 ft^2); two circular clarifiers; four aeration tanks; two aerobic digesters; and five sludge drying beds.

The PORTS sanitary sewers feed by gravity into one of six lift stations around the plant site or feed directly to the X-614A Pump Station on X-6614J Sewage Lift Station. The sewage collection system is constructed of vitrified clay tile. The lines from the lift stations to the X-614A Pump Station are vitrified clay pipe, and the force main from X-614A to the X-6619 Sewage Treatment Facility is cast-iron pipe. The lift stations and the pump station operate independently.

The X-6619 Sewage Treatment Plant utilizes aerobic digesters, aeration tanks, clarifiers, filters, and an activated sludge process to provide adequate sewage treatment. Following post-chlorination, dechromanation, and effluent monitoring, treated wastewater flows directly to the Scioto River through a pipeline. Dried digested sludge is containerized in 209-L (55-gal) drums and is stored as low-level waste on-site pending subsequent disposal at an appropriate disposal facility such as Envirocare in Utah.

3.9.2.5 Holding ponds and lagoons

Holding ponds and lagoons are used to control plant process effluent and storm water runoff. The ponds and lagoons also promote chlorine dissipation and settling of sediment mobilized by storm water runoff. Many also serve as spill retention basins to prevent off-site migration of spills or accidental discharges until treatment or recovery can be accomplished. Several ponds were designed specifically to treat process effluent. For example, the X-611B Sludge Lagoon is used for deposition of lime sludge generated from the drinking water purification process. Table 3.13 summarizes all the holding ponds on-site, their respective uses, and the surface water bodies into which they drain.

Table 3.13. PORTS holding ponds

Pond	Location (Quadrant)	Purpose/use	Discharges to
X-230J5	West (III)	Control storm water runoff/sedimentation	Scioto River
X-230J6	Northeast (IV)	Control storm water runoff/sedimentation	Little Beaver Creek
X-230J7	Northeast (II)	Control storm water runoff/sedimentation	Little Beaver Creek
X-230K	Southeast (I)	Control storm water runoff/coal pile steam plant discharge	Big Run Creek
X-230L	North (IV)	Spill retention/control storm runoff/sedimentation	Little Beaver Creek
X-611A[a]	Northeast (IV)	Lime sludge lagoons (3), water treatment effluent	Little Beaver Creek
X-611B	Northeast (IV)	Lime sludge lagoon, water treatment effluent	Little Beaver Creek
X-701B	Northeast (II)	Treatment of effluent	East Drainage Ditch
X-2230M	Southwest (I)	Control storm water runoff/sedimentation from GCEP	Scioto River
X-2230N	West (III)	Control sedimentation from GCEP construction	Scioto River

Source: DOE 1999b.
[a]Converted to a prairie habitat.
GCEP = Gas Centrifuge Enrichment Plant.

3.9.2.6 Telecommunications

PORTS currently has two Fujitsu-Omni 53 telephone switches with 2300 existing line connections. The site feed lines are copper cables capable of handling analog and digital signals through the Piketon, Ohio, exchange. Long distance service is through the Federal Telephone System. Commercial phone service is available. The site distribution system contains both copper and fiber-optic units.

3.10 NOISE

Noise at PORTS is intermittent and intensity levels vary. Noise levels associated with construction and processing activities and local traffic are comparable to those of any other industrial site. No sensitive receptor sites, such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, or hotels, are in the immediate vicinity of PORTS.

3.11 EXISTING RADIOLOGICAL AND CHEMICAL EXPOSURES

3.11.1 Public Radiation Dose

Potential impacts on human health from PORTS operations were calculated based on environmental monitoring and surveillance data. The effect of radionuclides released to the atmosphere was characterized by calculating effective dose equivalents (EDEs) to the maximally exposed person (a hypothetical individual who is assumed to reside at the most exposed point on the plant boundary) and to the entire population (approximately 918,000 residents) within 80.47 km (50 miles) of the plant. The maximum potential EDE to an off-site individual from DOE air emission sources at PORTS in 1999 was 0.00048 millirem (mrem)/year. USEC calculated the maximum potential dose to an off-site individual in 1999 to be 0.28 mrem/year. The combined dose from USEC and DOE sources is well below the 10 mrem/year NESHAP limit applicable to PORTS and the 300 mrem/year (approximate) dose that the average individual in the United States receives from natural sources of radiation. The collective EDE to the entire population within 80.5 km (50 miles) of PORTS in 1999 was 1.0 person-rem, based on USEC calculations of 1.0 person-rem/year from USEC sources and 0.00077 person-rem/year from DOE sources. The collective EDE to the nearest community, Piketon, was calculated to be 0.15 person-rem/year, based on USEC calculations of 0.15 person-rem/year from USEC sources and 0.00014 person-rem/year from DOE sources (DOE 2000c).

Based on a person driving past the PORTS depleted uranium cylinder storage yards to and from work for a year, the maximum estimated potential exposure to a member of the public from radiation from the cylinder yards is less than 0.55 mrem/year. The average yearly dose to a person in the United States from natural and man-made radiation sources is approximately 366 mrem. The potential estimated dose from the cylinder yards to a member of the public is less than 0.2% of the average yearly radiation exposure for a person in the United States.

3.11.2 Occupational Radiation Dose

The Radiation Exposure Information Reporting System report is an electronic file created annually to comply with DOE Order 5484.1. This report contains exposure results for all monitored individuals at PORTS, including visitors, with a positive exposure during the previous calendar year. The 2000 Radiation Exposure Information Reporting System report indicated that there were no visitors with a positive exposure. The average total effective dose in 2000 for all PORTS employees and subcontractors was 3.72 mrem (DOE 2000c).

3.11.3 Public Chemical Exposures

Direct exposure to chemicals from PORTS does not represent a likely pathway of exposure for the public. For airborne releases, concentrations off-site are below levels which would present problems through dermal exposure or inhalation pathways. Water discharge outfalls are located within areas of the site that are not readily accessible to the general public. Public exposure to water from the outfalls on a daily basis is highly unlikely, and ingestion of water directly from the outfalls is even less likely.

3.11.4 Occupational Chemical Exposure

Historically, PORTS operations involved the use of a variety of chemicals and toxic metal hazardous materials to which workers (potentially) have been exposed. These included solvents (e.g., TCE, carbon tetrachloride, methylene chloride, and benzene), toxic materials (e.g., arsenic, mercury, lithium, chromium, nickel, and beryllium), toxic gases [e.g., fluorine, hydrogen fluoride (HF), welding fumes, hydrogen cyanide, chlorine, chlorine trifluoride and its byproducts, and ammonia], acids (e.g., nitric acid and hydrochloric acid), and biocides and fungicides. Many of these materials have been greatly reduced or eliminated from routine operations, but workers involved in environmental restoration and waste management activities continue to face potential exposures.

The Hazardous Chemical Inventory Report, which includes the identity, location, storage information, and hazards of the chemicals that exceeded threshold planning quantities, is submitted annually to state and local authorities. Twenty-one materials stored by DOE-PORTS exceeded the threshold planning quantities in 2000: aluminum oxide, diesel fuel, ethylene glycol, lithium hydroxide, PCBs, sodium fluoride, sulfuric acid, triuranium octaoxide, UF_6, uranium tetrafluoride, uranium (ingots and fuel rods), uranium trioxide, uranium dioxide, asbestos, argon, gasoline, lube oil, Trichloroethane (TCA), sodium chloride, methanol, and oxygen.

3.11.5 Occupational Health Services

Occupational health services for DOE and DOE's site management contractor employees have been arranged through a subcontract with the Southern Ohio Medical Center (SOMC), Portsmouth, Ohio. SOMC is a full-service community medical center, and its occupational health clinic offers comprehensive occupational health services, including chemical exposure screening. The SOMC occupational medical staff has some familiarity with PORTS operations from past contracts with the USEC Medical Department.

DOE's site management contractor and subcontractors are responsible for procuring their own medical services from SOMC. Some subcontractors have opted to retain the on-site medical services of the USEC Medical Department. DOE's site management contractor has mandated that the PORTS subcontractors adhere to the medical requirements in DOE Order 440.1A, Chapter 19, "Occupational Medicine," as listed in Exhibit G of their subcontracts.

3.12 ACCIDENTS

Potential accidents at PORTS are primarily associated with the approximately 13,900 DOE-managed cylinders containing depleted UF_6. The cylinders are stored in the X-745-C (C-yard) and X-745-E (E-yard) located in the northern part of PORTS just inside Perimeter Road.

The chemical and physical characteristics of depleted UF_6 pose potential health risks, and the material is handled accordingly. Uranium and its decay products in depleted UF_6 in storage emit low levels of alpha, beta, gamma, and neutron radiation. The radiation levels measured on the outside surface of filled depleted UF_6 cylinders are typically about 2 to 3 mrem/h, decreasing to about 1 mrem/h at a distance of 0.3 m (1 ft). If depleted UF_6 is released to the atmosphere, it reacts with water vapor in the air to form hydrogen fluoride (HF) and a uranium oxyfluoride compound called uranyl fluoride. These products are chemically toxic. Uranium is a heavy metal that, in addition to being radioactive, can have toxic chemical effects (primarily on the kidneys) if it enters the bloodstream by means of ingestion or inhalation. HF is an extremely corrosive gas that can damage the lungs and cause death if inhaled at high enough concentrations.

Cylinders are stored with minimum risks to workers, members of the general public, and the environment at PORTS. DOE maintains an active cylinder management program to improve storage conditions in the cylinder yards, to monitor cylinder integrity by conducting routine inspections for breaches, and to perform cylinder maintenance and repairs to cylinders and the storage yards, as needed.

Potential accidents related to the PORTS cylinder yards have been analyzed in the SAR for PORTS (LMES 1997). The SAR identified major hazards associated with confinement failures that could result in the release of UF_6—a release of solid or gaseous UF_6 to the atmosphere from cylinder failure and a cylinder yard fire. In the first case, a large spill of solid material was considered to bound all of the smaller releases that could occur. The conclusions of the SAR were that cylinder failure does not pose a severe health risk beyond approximately 200 m (656 ft). Because of the slow release rate, workers in the immediate area of the release could easily evacuate the area without being significantly exposed. On-site personnel are trained to flee areas where releases are detected by sight and/or odor (i.e., odor of HF at extremely low concentration levels is easily detectable). Beyond the 200 m (656 ft) and for the off-site public, both uranium intake and the HF exposure were estimated to be below the guideline threshold values of 10 mg uranium intake and 2.3 mg/m^3 HF exposure with no mitigation.

In the case of the cylinder yard fire, the event was not expected to occur during the life of the facility but was postulated as a worst-case scenario. The conclusions for the cylinder yard fire showed that the threshold values designed to protect public health of 30 mg uranium intake and 23.2 mg/m^3 HF exposure could be exceeded on-site to about 275 m (900 ft) for the initial release if no mitigative actions were taken. Off-site boundaries are greater than 300 m (984 ft) from the cylinder yards. This scenario is estimated to have an extremely unlikely frequency. Primary controls to minimize the likelihood of a cylinder yard fire include preventative measures (e.g., inspection of cylinders before welding and the Fire Protection Program and its established controls). Although a cylinder yard fire case exceeds the guidelines for distances on-site, the combination of stringent controls to prevent a fire and a well-prepared emergency response plan limit the associated risk.

The disposition of the cylinders at PORTS has been addressed by DOE in the Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269). The decision to construct and operate a cylinder conversion facility at PORTS will affect the probabilities and impacts of potential accidents.

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4. ENVIRONMENTAL CONSEQUENCES

This section describes the environmental consequences associated with the proposed action and alternatives. Potential environmental impacts were analyzed for each of the primary media pathways (e.g., air, geology and soils, water resources, ecological resources). Additional analysis of impacts to the environment may be found in the Quadrant II CAS/CMS [Sections 6.6, 6.7, 7.5, and 7.6] and an addendum to the Quadrant II CAS/CMS [Chapter 2].

4.1 LAND AND FACILITY USE

4.1.1 Proposed Action

Under the proposed action, the general use of the land in Quadrant II would remain unchanged. The land that may be impacted by the corrective measures activities is currently being used for industrial activities focused on environmental remediation. The proposed action may change the nature of some of the existing remediation activities and add new corrective measures but will not change the type of activities for which the land is currently being used. Some buildings and storage yards may need to be removed, relocated, and/or rebuilt where there are interferences with proposed corrective measures implementation actions.

4.1.2 No Action

Under the no action alternative for Quadrant II, the existing remediation activities would continue at their present levels. There would be no impact on land or facility use from present uses.

4.2 AIR QUALITY

4.2.1 Proposed Action

Local air quality should be minimally affected by emissions from vehicle and equipment exhaust, fugitive dust from vehicle traffic, and disturbance of soils during construction. These emissions would include carbon monoxide, nitrogen dioxide, sulfur dioxide, PM-10 (inhalable particulate matter with particles less than 10 microns in diameter), and hydrocarbons. The level of permitted emissions would be documented in Ohio EPA construction/operation permits that must be obtained prior to construction activities. Particulate matter emissions would primarily consist of airborne soil. Site preparation and construction emissions would be short term, sporadic, and localized (except for emissions from vehicles of construction workers and of transport of construction materials and equipment). Dispersion would decrease concentrations of pollutants in the ambient air as distance from the construction site increased. Increments of pollutants due to workers' vehicles and construction vehicles and equipment would not be expected to cause any exceedances of primary or secondary NAAQS (Table 3.1).

Small increases in PM-10 concentrations (inhalable particulate matter with particles less that 10 microns in diameter) due to fugitive dust from excavation and earthwork probably would be noticeable on-site during construction of the cap corrective measure option and during soil excavation. Emissions would be localized at the X-701B site and off-site impacts to ambient air quality would not be expected. Control measures for lowering fugitive dust emissions (i.e., covers and water or chemical dust suppressants) would minimize local emissions.

Installation of corrective measures such as oxidant injection wells, planting of trees for phytoremediation, installation on VER and/or steam stripping equipment could cause a small temporary reduction in local ambient air quality as a result of fugitive dust and emissions generated by construction equipment. Off-gas treatment systems may be required for the VER/Steam Stripping corrective measures but emissions from the treatment systems should be minimal. The demolition/replacement of the existing facilities could also have a minor temporary effect. The extent of dust generation would depend on the level of construction activity and on soil composition and dryness, and the degree of dust suppression techniques employed. The emissions from construction vehicles and equipment would not be expected to have an impact on the overall air quality of the region.

4.2.2 No Action

No additional air emissions would result from the Quadrant II no action alternative. Airborne emissions from ongoing uranium enrichment operations were reduced in May 2001 as a result of placing the enrichment cascade in cold standby. Emissions from Transfer and Shipping activities are expected to continue until June 2002. Ongoing environmental restoration and D&D activities would be expected to continue as well. Air quality effects from ongoing operations and remedial actions in Quadrant II are relatively small, and the radiological dose via the air pathway is well below applicable limits.

4.3 GEOLOGY AND SOILS

4.3.1 Proposed Action

Because all activities would take place in areas encompassing PORTS industrial activities, no existing or potential farmland protected under The Farmland Protection Policy Act would be impacted.

Significant amounts of excavation and soil contouring could occur under the proposed action at the X-701B Holding Pond and Retention Basins area. Site clearing, grading, and contouring for a cap could alter the topography of the land around the X-701B Holding Pond and Retention Basins but should not effect the underlying geological formations. In addition, removal of contaminated soil and capping of the remaining contaminated area would be considered a beneficial impact.

Minor excavation would be required in previously disturbed areas in order to install groundwater treatment systems. Impacts to geology and soils would be negligible.

4.3.2 No Action

No impact to the geology of Quadrant II is expected to occur under the no action alternative.

4.4 WATER RESOURCES

4.4.1 Proposed Action

For the alternatives evaluated, uncontrolled soil erosion would increase sedimentation and turbidity in the receiving surface waters. Spills of fuel, hazardous material, waste, or a sewer line leak could have adverse impacts on surface waters if not controlled or contained. Impacts would primarily be a change to the water quality (pH, dissolved oxygen, conductivity, etc.), which could affect vegetation and aquatic biota. Soil erosion impacts would be mitigated through the use of best management practices (BMPs) (i.e., silt fences, straw bales, and temporary sediment detention basins). The potential for spills would be mitigated through the adherence to proper safety procedures and spill prevention plans. In the event of a spill from an accident, spill response measures (e.g., booms, berms, sorbents, neutralizers, secondary containment, and mechanical removal equipment) would minimize potential adverse impacts.

Coordination with DOE and their site management contractor's Environment, Safety, and Health organization also would be required prior to any earth-disturbing activities, changes in discharges to the storm drain system, outdoor application of herbicides and pesticides, or facility modifications.

Impacts to groundwater quality could also occur as a result of a fuel, waste spill, or a sewer line leak and subsequent migration of contaminants through the soil profile to the groundwater table. A spill directly into the surface water bodies in the vicinity also could affect the groundwater quality because of the connection between surface water and groundwater resources. The use of safety procedures, spill prevention plans, and spill response plans in accordance with state and federal laws would minimize the severity of potential impacts from accidents.

The small potential impact to surface waters would originate from soil erosion, runoff, and sedimentation during excavation and capping activities, well installation, or modification of groundwater treatment facilities. In addition, a fuel, hazardous material, waste spill or leak could occur during construction activities and operation of new groundwater treatment facilities. As mentioned previously, soil erosion impacts would be mitigated through the use of BMPs (i.e., silt fences, straw bales, and temporary sediment detention basins). The potential for spills would be mitigated through the adherence to proper safety procedures and spill prevention plans. Additional discussion of these potential impacts can be found in the Quadrant II CAS/CMS [Chapters 6 and 7] and the Addendum to Quadrant II CAS/CMS [Chapter 2].

4.4.2 No Action

Under the Quadrant II no action alternative, the site could expect continued impacts to surface water and groundwater. Although monitoring and appropriate environmental restoration measures would be continued and appropriate mitigation measures would remain in place, releases could occur. Impacts to surface water or groundwater could also occur as the result of a spill or leak from ongoing operations. Surface and groundwater protection measures, such as spill prevention and spill response plans, are already in place at PORTS for ongoing operations.

4.5 FLOODPLAINS AND WETLANDS

4.5.1 Proposed Action

The construction activities at the X-701B Holding Pond and Retention Basins and the X-701B groundwater plume associated with the range of possible corrective measures may impact wetlands adjacent to these units and area streams. However, these potential impacts would be indirect and in the form of potential accidental releases that could result in contamination of wetlands and area streams. As currently envisioned, the proposed corrective measures are designed to preclude any direct impact on adjacent wetlands. Control measures such as silt fences, erosion control, and dust prevention as well as other possible engineered controls would be utilized to prevent any indirect impacts. Neither adverse nor beneficial influences on flood elevations will occur because Quadrant II is not located in a 100- or 500-year floodplain.

4.5.2 No Action

Under the Quadrant II no action alternative, the PORTS site could expect impacts to surface water and groundwater. Consequently, impacts to floodplains and wetlands could result from transport of contaminants through surface water and groundwater to these sensitive areas. Although monitoring and appropriate environmental restoration measures would be continued as long as operational activities are taking place, eventual abandonment of the Quadrant II contaminated areas without restriction could possibly result in the spread of contamination to floodplains and wetlands in and surrounding the site.

4.6 ECOLOGICAL RESOURCES

4.6.1 Proposed Action

Activities associated with the proposed action would have no direct impact on terrestrial habitats, plants, and animals present within PORTS. Since there are no construction activities associated with this alternative outside of previously disturbed areas, no adverse impacts to terrestrial and aquatic ecosystems would be expected. If impacts to ecological resources at PORTS are encountered, they would be addressed by avoiding the resource, minimizing the impact, or mitigating the impact if avoidance or minimization is not possible.

No direct or indirect impacts would occur to any threatened and endangered species from completion of the proposed action. No federally listed threatened and endangered plants or animals are known to exist within the boundary of PORTS. Carolina yellow-eyed grass (state-listed endangered) and Virginia meadow-beauty (state-listed potentially threatened) occur within Quadrant IV, but these areas would not be affected by this alternative. The USFWS has indicated that the Indiana bat is the only federally listed endangered animal species whose home range includes PORTS, although no Indiana bats have ever been captured or observed at the site. The USFWS has recommended that if potential roost trees with exfoliating bark are encountered in any area proposed for development, they and surrounding trees should be saved wherever possible. If such trees are within the area and they require removal, they should not be cut between April 15 and September 15. If potential maternity roost trees are present, and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if Indiana bats are present. If needed, the surveys should be conducted in June or July to coincide with the peak summer bat population. If direct impacts to potential Indiana bat habitat could not be avoided, DOE would implement the USFWS recommendations.

The proposed action for conducting corrective measures activities in Quadrant II at PORTS would lie within the range of the habitat for the timber rattlesnake, a large shy rattlesnake that is declining throughout its national range. No Federal listing status has been assigned to this species; however, the USFWS has initiated a pre-listing Conservation Action Plan to support state and local conservation efforts. The timber rattlesnake is protected throughout much of its range and listed as endangered by the State of Ohio. Proactive efforts to conserve this species would be taken to avoid potential impacts to the timber rattlesnake and their habitat including protection of winter dens which is critical to the survival of this species. Although the distribution of the timber rattlesnake species includes PORTS, there have been no sightings at the site. Procurement documents for corrective measures construction activities would contain provisions for the protection of sensitive wildlife populations if encountered including Indiana bats and timber rattlesnakes.

4.6.2 No Action

The potential exists for a spill or leak from normal ongoing operations and traffic at Quadrant II. Impacts to biota could include direct mortality, injury, and degradation of the impacted habitat. Because of the limited habitat and biota at the site, these impacts would probably be minor to moderate and the resource would be expected to recover within a few months to a year depending on the severity of the spill or leak. Without completing the recommended corrective actions at Quadrant II, the potential for migration of contamination currently present at controlled areas of the plant will be greater if current controls are not maintained following cessation of ongoing operations. This migration would have the potential for impacting biota on and nearby the site due to increased long-term exposure to contaminants.

4.7 CULTURAL RESOURCES

4.7.1 Proposed Action

Notifications of the proposed actions have been provided to Ohio SHPO (a copy of the notification letter and response are included in Appendix A). In previous discussions with the Ohio SHPO, the preservation office has stated that PORTS is considered eligible for inclusion in the NRHP because of its exceptional significance in the history of post-World War II United States and, in particular, in our development on nuclear energy potential. DOE PORTS provided a determination that there would be an adverse effect on four of the facilities at PORTS as a result of the proposed action. Because the facilities involved are not considered contributing resources, however, negligible, if any, effects on the historical integrity of the PORTS core plant are anticipated. In addition to the NHPA, cultural resources on federal lands are also protected under the Archaeological Resources Protection Act of 1979, as amended, and the Native American Graves Protection and Repatriation Act of 1990. If an unanticipated discovery of cultural materials (e.g., human remains, pottery, bottles, weapon projectiles, and tools) or sites was made during development activities, all ground-disturbing activities in the vicinity of the discovery would be halted immediately. The DOE-Oak Ridge Operations (ORO) Cultural Resources Management Coordinator would be contacted, and consultation with the Ohio SHPO would be initiated and completed prior to any further disturbance of the discovery-site area.

One existing facility in Quadrant II may be directly effected by one of the proposed corrective measures alternatives at the X-701B Holding Pond and Retention Basins and would have to be removed if that corrective measure is chosen and implemented. This facility is the X-701E Neutralization Building. The X-701E facility was built around 1973 as a pumphouse/treatment facility near the influent to the X-701B Holding Pond. The 18 ft by 22 ft building is made of steel frame with aluminum panels and is built on a concrete pad. The building and the treatment pond it supported were deactivated in 1988. The building has been used periodically since 1990 as a treatment facility for groundwater in the area of the X-701B Holding Pond. Because of its recent construction, the fact that it is not unique in terms of history, architecture or engineering, and the fact that it adds little to the understanding of the facility, the demolition of this facility will have no effect on the structures and the qualities that give significance to this historic property. A file will be maintained including mapping and photographs showing the setting of this facility before and after the construction.

One existing facility in Quadrant II would be directly impacted by several of the proposed corrective measures for the X-701B groundwater plume and would have to be removed if any of those corrective measures are chosen and implemented. This facility is the X-747G Precious Metal Scrap Yard. The X-747G Precious Metal Scrap Yard was constructed in 1976. This 25,000 ft^2 outdoor storage area is surrounded by an 8 ft, chain link, wire fence and is used for the storage of contaminated cascade scrap metal parts made of valuable alloys. Because of its recent construction, the fact that it is not unique in terms of history, architecture or engineering, and the fact that it adds little to the understanding of the facility, the demolition of this facility will have no effect on the structures and the qualities that give significance to this historic property. A file will be maintained including mapping and photographs showing the setting of this facility before and after the construction.

Two temporary treatment and support facilities in Quadrant II have reached the end of their operational life and may be replaced under certain corrective measures scenarios described in the proposed action. These are the X-622T Groundwater Treatment Facility and the X-624 Groundwater Treatment Facility. These replacement facilities will be necessary to continue to support the control and remediation of the Quadrant II groundwater plumes. The X-622T unit is a trailer-mounted unit built in the early 1990s to treat groundwater pumped from the building sumps in the X-705 Decontamination Building and X-700 Cleaning Building. Other groundwater generated from non-routine activities around the plant were also occasionally treated at this unit. The X-624 unit was constructed in the 1993-1995 timeframe to treat primarily groundwater collected from an interceptor trench running across the east side of the X-701B Groundwater Plume. All of these buildings are pre-fabricated steel-frame type buildings build on concrete pads. These buildings will be torn down to the concrete pad and new units constructed near the current sites to support new treatment processes. The X-622T replacement unit will be built near the current location. The replacement for the X-624 unit would also be constructed near the site of its current location. As with the X-701E building and the X-747G Storage Yard, the demolition of these facilities will have no effect on the structures and the qualities that give significance to this historic property. Files will be maintained including mapping and photographs showing the setting of each of these facilities before and after the construction.

4.7.2 No Action

Under the Quadrant II no action alternative, these facilities would eventually be abandoned and gradually deteriorate due to a lack of use and maintenance.

4.8 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.8.1 Proposed Action

The potential socioeconomic impacts of the proposed corrective measures activities for PORTS including demographics, employment, income, housing, public services, local government expenditures, and fiscal characteristics would be minimal. Some small and temporary increase in employment may be experienced as a result of the construction activities. No environmental justice impacts would be expected to occur from this proposed action due to the minimal impact of the proposed action off-site and the fact that there are no nearby populations of minorities which might be effected.

4.8.2 No Action

No socioeconomic or Environmental Justice impacts are associated with the Quadrant II no action alternative.

4.9 INFRASTRUCTURE AND SUPPORT SERVICES

4.9.1 Transportation

4.9.1.1 Proposed action

Under this proposed action, construction activities would result in a temporary increase in truck traffic. The number of vehicle trips to and from the site would probably be slightly greater than the current levels during the construction activities at the X-701B Holding Pond and Retention Basins area and the X-701B groundwater plume area. Impacts to transportation in the area would not require modification of roads or other infrastructure to accommodate additional traffic. The potential to ship waste to an off-site treatment, storage and disposal facility would produce a slight increase in the risk of a traffic related accident during transport. Due to the fact that this type of shipment is routinely performed at the site as a result of current operations, the increase in risk should be minimal. Shipment of these wastes would comply with all Department of Transportation (DOT) requirements including the use of DOT approved containers for shipment to minimize the risk of spills in the event of a transportation accident. Existing site processes and procedures, which are currently in place at the site to ship this type of waste to off-site treatment, storage and disposal facilities would be incorporated for the planning and execution of these shipments if required as part of corrective measures implementation.

4.9.1.2 No action

No transportation impacts are associated with the Quadrant II no action alternative.

4.9.2 Utilities

4.9.2.1 Proposed action

The potential utility impacts of the proposed action would be minimal.

4.9.2.2 No action

No utilities impacts are associated with the no action alternative.

4.10 NOISE

4.10.1 Proposed Action

The construction activities that would be required to implement the proposed action would result in minor, temporary increases in noise levels at the site. Noise would return to current levels after completion of construction activities.

4.10.2 No Action

No additional noise impacts are associated with the no action alternative.

4.11 HUMAN HEALTH AND SAFETY

No unique occupational health and safety hazards would be posed by any of the alternatives considered, including the proposed action. Falls, spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation could occur. Similar hazards also would be present during construction activities. Heating of soil using electrodes during steam stripping corrective measures, if utilized, would require setting up of engineered barriers to prevent worker exposure to high voltages. Workers would be expected to receive applicable training, be protected through appropriate controls and oversight, and follow standard industrial and protective engineering practices, including the use of personal protective clothing and equipment as specified in the applicable Occupational Safety and Health Act of 1970 (OSHA) regulations (e.g., 29 *CFR* 1910 and 29 *CFR* 1926).

On-site occupational radiological exposures for subcontractors implementing any modifications discussed in this EA would be similar to the doses estimated for on-site workers and would be kept below the 5000 mrem/yr limit for occupational exposure of radiation workers set by the Nuclear Regulatory Commission (NRC) and DOE. However, DOE has established an administrative control limit of 2000 mrem/yr. BJC has adopted DOE's administrative control limit guidance as their policy. To further reduce exposures, each BJC project establishes an even lower administrative control level. PORTS follows the principles of As Low As Reasonably Achievable to further limit doses to the workers as much as possible. No unique chemical exposures would be anticipated from construction activities. Potential chemical exposures for on-site workers could include various hazardous materials and chemicals such as solvents, ketones, toluene, methanol, xylenes, formaldehyde, phenols, acids, ammonia, metals, and silicates. All activities involving chemicals would be expected to comply with applicable OSHA regulations including environmental exposure standards, applicable training requirements, hazard communication programs, engineering controls, and the use of personal protective clothing and equipment. DOE has taken responsibility for the health and safety oversight on federal property with radiological restrictions.

Activities at PORTS conducted by DOE that could impact the public are subject to DOE Orders 5400.1, *General Environmental Protection*, and 5400.5, *Radiation Protection of the Public and the Environment*. Current chemical and radiological exposures would likely continue at low levels as they currently exist.

Occupational exposures for DOE and contractor workers follow the requirements of DOE Order 440.1A, *Worker Protection Management for DOE Federal and Contractor Employees*, and 10 *CFR* 835, *Occupational Radiation Protection*. The NRC performs regulatory oversight of USEC activities. OSHA regulates USEC occupational safety and worker health, and the Ohio EPA and the U.S. EPA regulate USEC environmental activities.

4.11.1 Proposed Action

No additional health and safety impacts beyond those typically encountered as part of current ongoing operations at PORTS are expected with the proposed action.

4.11.2 No Action

Additional health and safety impacts may be experienced with no action alternative as a result of long-term increased migration of contaminants from the X-701B Holding Pond and Retention Basins and the X-701B groundwater plume resulting from the loss of containment and a longer residual contamination period.

4.12 ACCIDENTS

Under any of the alternatives evaluated, accidents could occur during construction activities or operation of a new or existing facility. Accidents could result from operator error, equipment malfunction, or from natural phenomena (e.g., earthquakes, tornadoes, flooding, fire, etc.). Typical accidents that could result from construction activities include falls, chemical spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation. Potential hazards from the operation of facilities could include radiation sources, toxic/corrosive/reactive materials, flammable materials, and electrical energy. Other hazards include kinetic energy and stored energy. Examples of kinetic energy hazards include moving ventilation system components, forklifts, and other drum- or box-handling equipment. Stored energy hazards include elevated structures and equipment, stacked drums, and boxes. Consequences of these hazards could potentially include: internal and external radiation exposure to on-site and off-site personnel; exposure of on-site and off-site personnel to toxic chemicals; building fire resulting in the release of toxic and radioactive materials and the production of toxic gases, smoke, and/or corrosive materials; electrical burns, shock, and electrocution; and bruises, broken bones, cuts, etc.

An example of a typical accident that could potentially occur during the operation of an existing or new facility would be a building fire. The consequences of a potential fire would depend on several factors, including building construction materials and design and the types and quantities of materials used and stored within the building. Although most fires start as small, localized fires, the amounts of flammable materials and combustibles available in the facility could make a fire grow in intensity. There is the potential that a fire could spread and involve a major portion of the building, but with the proper mitigation measures in place, it is most likely that the fire would remain localized, affecting only the area where the fire was initiated.

A toxic material release could potentially occur inside a building as the result of a fire or explosion. Although the majority of the toxic material release concerns would be localized, the potential would exist for toxic gases or aerosols to be drawn into the building ventilation system and be distributed throughout other sections of the building. If the event were large enough, these gases or aerosols could be released to the outside.

The potential for fires and any resulting adverse impacts would likely be mitigated by the following: building modification materials would comply with all applicable National Fire Protection Association codes and standards; buildings would be equipped with fire detection systems and fire suppression equipment as applicable (e.g., fire alarms, portable fire extinguishers, and sprinkler systems); and appropriate fire safety and emergency policies and procedures, including proper training, would be implemented. Emergency response would be provided by the on-site Fire Services and through mutual-aid agreements with the surrounding fire departments and emergency response organizations.

Accidental spills of hazardous materials during construction activities or facility operations could cause contamination of localized areas of soil and subsequent impacts on surface waters and groundwater. Terrestrial and aquatic plants and animals in the affected areas could also be adversely impacted. Accidental releases of high concentration and/or large quantities of hazardous materials could cause water quality standards to be exceeded and result in fish kills. Impacts from accidental spills and releases would be addressed by individual operating entities through the use of safety procedures and spill prevention and response plans.

The Emergency Planning and Community Right-To-Know Act of 1986, also referred to as the Superfund Amendments and Reauthorization Act Title III, requires reporting of emergency planning information, hazardous chemical inventories, and releases to the environment. Section 304 of the Emergency Planning and Community Right-To-Know Act requires reporting of off-site reportable quantity releases to state and local authorities. Accident scenarios and consequences from ongoing operations are addressed in the SAR for PORTS (LMES 1997).

4.12.1 Proposed Action

Transportation accidents under the proposed action would be expected to be similar to those that could potentially occur during normal operations at PORTS and would depend on the types and amounts of traffic entering and exiting the roads and highways in and around the site. The most common type of transportation accident that would be expected to occur would be vehicular accidents involving site workers or visitors. The increased traffic associated with construction activities such as the movement of soils to the X-701B Holding Pond and Retention Basins to construct a cap over the facilities would result in a temporary increased risk of a transportation related accident. No additional accident impacts are associated with the proposed action.

4.12.2 No Action

No additional transportation impacts are associated with the no action alternative.

4.13 WASTE MANAGEMENT AND WASTE MINIMIZATION

It is anticipated that solid waste, decontamination/groundwater solutions and construction debris would be generated as part of any of the alternatives evaluated. Waste generation, storage and handling, including any pollution prevention and waste minimization practices, would be accomplished in accordance with established procedures and regulations.

4.13.1 Proposed Action

It is anticipated that from 40,000 ft^3 (selective excavation) to 2,100,000 ft^3 (complete excavation) of waste material may be generated in the excavation of contaminated soil scenario and 83,000 ft^3 in the construction of a cap over the X-701B Holding Pond and Retention Basins. Minor amounts (96 ft^3) of construction debris and personal protective equipment (PPE) would also be generated. This material would be contaminated with both low level radioactive (LLW) and RCRA regulated constituents and would be disposed of in an appropriate treatment, storage, or disposal facility licensed to handle this type of waste. Approximately 275 gal of decontamination solutions and/or groundwater would also be generated from this action. These liquids would be treated on-site at existing treatment facilities.

Approximately 276 ft^3 of contaminated soils may be generated during the implementation of the corrective measures efforts for the X-701B groundwater plume. In addition, approximately 37 ft^3 of PPE and 275 gal of decontamination solutions and/or groundwater may be generated. The solid waste would be disposed of at an appropriate treatment, storage, or disposal facility licensed to handle this type of waste and the liquid would be treated on-site at existing treatment facilities.

The X-622T Groundwater Treatment Facility demolition and replacement may generate approximately 15 ft^3 of contaminated soil from the installation of an additional extraction well along with 15 ft^3 of PPE and 55 gal. of decontamination solutions. Demolition of existing equipment will generate approximately 1728 ft^3 of scrap metal (classified as LLW) in the form of two Frac Tanks with wheels (6 ft x 11 ft x 40 ft), two carbon tanks (8 ft diameter x 10 ft high), an air stripper (5 ft x 5 ft x 6.5 ft) and piping. Approximately 480 ft^3 of waste carbon (classified as LLW/RCRA) would also be generated from this activity. The solid waste would be disposed of at an appropriate treatment, storage, or disposal facility licensed to handle this type of waste and the liquid would be treated on-site at existing treatment facilities.

The X-624 Groundwater Treatment Facility replacement may generate approximately 544 ft^3 of contaminated soil from the installation of twelve new injection wells and one additional extraction well along with 30 ft^3 of PPE and 660 gal. of decontamination solutions. Demolition of existing equipment would generate approximately 1728 ft^3 of scrap metal (classified as LLW) in the form of two Frac Tanks with wheels (6 ft x 11 ft x 40 ft), two carbon tanks (8 ft diameter x 10 ft high), an air stripper (5 ft x 5 ft x 6.5 ft) and piping. Approximately 480 ft^3 of waste carbon (classified as LLW/RCRA) would also be generated from this activity. The solid waste would be disposed of at an appropriate treatment, storage, or disposal facility licensed to handle this type of waste and the liquid would be treated on-site at existing treatment facilities.

The potential relocation/demolition of the X-747G Precious Metal Scrap Yard would require the removal and/or disposal of the LLW material currently being managed in and adjacent to the yard as well as some nearby equipment, structures and power poles. The gravel base on which the material sits would also be removed and disposed of as necessary to provide final grade to the area. The estimated volume of LLW material to be disposed of out of the yard area is 24,000 to 30,000 ft^3. Any material that could not be disposed directly from the X-747G yard would be relocated and staged until disposal can be arranged. Once the LLW material is removed from the yard, the demolition of the remaining structures would generate only minor amounts of waste primarily from non-recyclable fencing material and construction debris. Characterization, handling, and disposal of all material and waste generated as a result of the relocation/demolition of the X-747G yard would be handled in accordance with existing plant procedures, guidelines, permits, Executive Orders, and all applicable Federal and State requirements.

4.13.2 No Action

The no action alternative would allow the continued generation of waste from the X-622T and X-624 for as long as they are able to continue to operate. This amounts to approximately 960 ft^3 waste carbon filtration media per year (generally classified as LLW/RCRA waste). This waste would be disposed of using current procedures and facilities.

4.14 CUMULATIVE IMPACTS

Cumulative impacts are those that may result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 *CFR* 1508.7, CEQ 1997) and can result from the combined or synergistic effects of individually minor actions over a period of time. This section describes past and present actions, as well as reasonably foreseeable future actions, that are considered pertinent to the analysis of cumulative impacts for the proposed action. These actions either have or will receive independent NEPA reviews. Future actions, although specific scope of these actions may not be accurately defined at this time, are considered for their potential to have cumulative effects in the foreseeable future.

The DOE-PORTS Environmental Restoration Program was developed in 1989 to find, analyze, and correct site contamination problems. Remedial actions taken at this site have resulted in improvement to conditions that resulted from past operations and management practices. Remedial actions may be accomplished by removing, stabilizing, or treating hazardous wastes. As of December 31, 1998, certification of closure had been received from Ohio EPA for 14 RCRA facilities:

- X-744G(U) Container Storage Facility
- X-735 Landfill (cells 1 through 6)
- X-616 Surface Impoundments
- X-705A Incinerator
- X-749 Landfill (northern portion)
- X-750 Waste Oil Tank
- X-752 Container Storage Facility
- X-700 Tank 6 Generator closure
- X-700 Chromic Acid Tank 7
- X-700 Tank 8 Generator closure
- X-744G(R) Container Storage Facility
- X-344A Settling Tank
- X-740A Waste Oil Facility and Tank
- X-326 Trap Material Storage Area (DMSA #7)

The Ohio EPA has designated five RCRA units at PORTS as "integrated units." They include:

- X-231B Southwest Oil Biodegradation Plot
- X-744Y Waste Storage Yard
- X-701B Surface Impoundments (East Retention Basis, West Retention Basin, and Holding Pond)
- X-701C Neutralization Pit
- X-230J7 East Holding Pond

Preliminary remedial action at these sites has been completed as required by closure plans and as directed by the Ohio EPA.

Several other solid waste units have also undergone closure or corrective measures implementation including the following:

- X-735 Industrial Solid Waste Landfill (closure)
- X-749 South Contaminated Landfill (closure)
- X-749A Classified Landfill (closure)
- X-231A Oil Biodegradation Plot (closure)
- X-749B Peter Kiewit Landfill (closure)
- X-734 Landfill (closure)
- X-734A and B Construction Spoils Landfills (closure)
- X-611A Sludge Lagoon (conversion to prairie)
- X-740 Waste Oil Storage Facility Area (phytoremediation)

These actions have resulted in improvements in the overall quality of the environment at PORTS by removing sources of environmental contamination and/or providing engineered barriers to prevent or slow the migration of potential environmental contaminants from these units. In addition, improvements have been made in the understanding of the extent and dynamics of the environmental contaminants through numerous investigations and studies that have been completed. Technology demonstrations completed to date have yielded valuable information leading to the selection of effective and cost efficient corrective measures technologies.

The DOE-PORTS Technology Applications Program was established in 1993 to facilitate the introduction of innovative or experimental environmental technology into the DOE-PORTS

Environmental Restoration Program. The primary function of the technology program is to identify, evaluate, and test/demonstrate innovative advancements in environmental characterization and cleanup. Projects include:

- X-231A soil fracturing demonstrations
- X-231B in situ soil mixing with TEVE
- X-625 passive groundwater treatment through reactive media
- X-749/X-120 VER wells
- X-701B in situ chemical oxidation and recirculation
- X-701B oxidant injection using the horizontal well
- X-701B oxidant injection using lance permeation
- X-701B VER using the five-spot configuration
- 5-Unit Area (Quadrant I groundwater investigative area) oxidant injection
- X-701B underground steam stripping and hydrous pyrolysis/oxidation
- Oxidant Injection utilizing dilute hydrogen peroxide at the X-701B Groundwater Plume Area

An additional technology demonstrations planned for the near future is the In-situ Anaerobic Reactive Zone Treatment technology demonstration at the X-749 Groundwater Plume Area.

Current environmental management activities include continued sampling and investigation activities aimed at finding and monitoring areas of past environmental contamination, obtaining certification for the completed cap on the X-734 Landfill, the certification of the remediation/closure of the X-701A Lime House and X-701C Neutralization Pit, the ongoing cleanup of the X-747H Scrap Metal Yard, and the upgrade in capacity/efficiency of the X-622 Groundwater Treatment Facility. In addition to the X-622 facility, four other groundwater treatment facilities have been constructed and are operational.

Another component of the environmental management program is waste management. The DOE-PORTS Waste Management Program directs the safe storage, treatment, and disposal of waste generated by past and present operations and from current Environmental Restoration projects. During 2000, approximately 8 million pounds of waste from PORTS were recycled, treated, or disposed. DOE-PORTS also stores USEC-generated hazardous waste in the RCRA Part B permitted storage areas.

Other planned environmental management activities include:

- complete corrective measures for Quadrants I and II

- disposal of 11,764 PCB/low-level waste containers in process buildings and outside storage areas, and

- disposal of 3877 containers of RCRA low-level waste

Long-term environmental management milestones include:

- by the end of 2003, assessments and agency-required remedial actions completed (not including those actions which must follow D&D)

- by the end of 2006, all DOE-PORTS environmental management waste shipped for final disposition; and

- beyond 2006, all D&D deferred corrective measures implemented, continued operations of active and passive groundwater treatment systems, site-wide groundwater protection program ongoing, and long-term surveillance and maintenance of remedial action and D&D facilities

4.14.1 Proposed DOE Program to Secure Supply of Enriched Uranium

On October 6, 2000, Energy Secretary Bill Richardson announced a plan to further protect U.S. energy security by placing the GDP at PORTS in cold standby.

On March 1, 2001, Energy Secretary Spencer Abraham announced that DOE would provide $125.7 million for winterizing, cold standby, and worker transition programs related to the ongoing transition at PORTS. In general, the $125.7 million was to be broken down over two years; $59.2 million for FY 2001 and $66.5 million for FY 2002. The money was to support placing the facility in cold standby mode, winterizing steps to protect the facility, and worker transition programs for displaced workers once the facility is placed into cold standby mode. In May 2001, the GDP was officially placed in the cold standby mode.

Cold standby involved placing those portions of the GDP needed for 3 million separative work units per year production capacity in a non-operational condition and performing surveillance and maintenance activities necessary to retain the ability to resume operations after a set of restart activities are conducted. Feed and withdrawal systems were also placed in standby. A cadre of cascade operators, utilities operators, and maintenance staff were retained and form the basis for future restart, operations, and maintenance. The power load was decreased to about 15 Megawatts (MW). Specific steps that went into placing the plant in cold standby included:

- removing uranium deposits in certain portions of the cascades
- buffering of process cells with dry air to prevent wet air in-leakage
- installing cell buffer alarms to assure that proper integrity of the system is maintained
- revising operating and maintenance procedures

4.14.2 Depleted UF_6 Conversion Facility

In April 1999, DOE issued a *Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DOE/EIS-0269) that described the preferred alternative for managing depleted UF_6. The Record of Decision (ROD) was issued in August 1999.

DOE has proposed to design, construct, and operate conversion facilities at PORTS and the PGDP in Kentucky. These facilities would convert DOE's inventory of depleted UF_6 now located at PORTS, PGDP, and the East Tennessee Technology Park in Oak Ridge, Tennessee, to triuranium octaoxide, uranium dioxide, uranium tetrafluoride, uranium metal, or some other stable chemical form acceptable for transportation, beneficial use/reuse, and/or disposal. A related objective is to provide cylinder surveillance and maintenance of the DOE inventory of depleted UF_6, low-enrichment UF_6, natural assay UF_6, and empty and heel cylinders in a safe and environmentally acceptable manner. A contract for the Depleted UF6 Conversion Project was awarded to Uranium Disposition Services on August 28, 2002.

Although no site has been selected until a separate NEPA review has been conducted and a ROD has been issued, the candidate site for the conversion facility at PORTS is the lithium warehouse area. This is an area surrounding and including warehouses X-744S, -T, and -U. The candidate site, in general, is bounded on the west side by an unnamed road west of X-744T; on the north and east side by a truck access road; and on the east and south side by a dirt construction road. Excluded from this area are buildings X-616, X-106B, and X-106C.

The proposed action would have no impact on the conversion facility. The proposed locations being considered for the facility are located on the far southern, west and northwest portions of the site. The pipeline route chosen would avoid the cylinder lots and potential sites for the proposed conversion facility.

4.14.3 Reindustrialization Program

Several ongoing initiatives are underway at PORTS in coordination with SODI, the recognized community reuse organization for PORTS. DOE's Office of Worker and Community Transition established community reuse organizations to minimize the negative effects of workforce restructuring at DOE facilities that have played an historic role in the nation's defense. These organizations provide assistance to the neighboring communities negatively affected by changes at these sites.

SODI was established in August 1995 and was incorporated as a non-profit organization in July 1997. The purpose of the organization is to create job opportunities within the four counties most affected by PORTS downsizing—Pike, Ross, Jackson, and Scioto. SODI members represent business, industry, education, economic development, government, DOE, BJC, and USEC. A Community Transition Plan was completed in 1997 and contains a series of initiatives designed to create the human and physical infrastructure necessary to decrease dependency on the DOE facility, diversify the economy, create high-wage jobs, strengthen the tax base, and improve the quality of life in the area.

DOE has provided $10 million dollars through grants to SODI for economic development projects and has committed an additional $2.95 million for Fiscal Year (FY) 2000–2001. SODI has invested this money primarily in the development of industrial parks in each of the four counties. In addition, SODI actively promotes the reuse of DOE property by private industry. The first lease between DOE and SODI was signed on April 1, 1998, for 2.4 to 3.2 ha (6 to 8 acres) of land on the north side of the PORTS property. The tract was used as a right-of-way (ROW) for a railroad spur to connect with the existing DOE north rail spur. A portion of this property was then subleased by SODI to the Mead Corporation for access to the rail line for a new wood grading operation. This action was covered under a NEPA Categorical Exclusion (CX) No. CX-POR-522 completed in 1997. A second lease between DOE and SODI was signed on October 13, 2000, for 4.9 ha (12 acres) of land adjacent to the area of the first lease. This tract will be used for additional railroad spurs and use of existing rail facilities. This action was covered under CX-PORTS-538.

Additional DOE real estate outgrants that have recently occurred at PORTS include the following:

- ROW easement for a waterline and sewer line,
- license for non-federal use of property for concurrent road usage,
- recreational license to Scioto Township for development of a community park,
- greenway licenses to Scioto Township and Seal Township, and
- lease/license (short-term) for use of parking lots by SODI.

Negotiations were initiated between DOE and SODI to transfer approximately 390 acres of land in the northeast corner of the site. This property, if transferred to SODI, would be subleased for the potential entities as part of a commercial/light industrial park. Negotiations regarding the transfer of this property are currently on hold.

4.14.4 Other Regional Industrial Developments

There are several industrial parks in the area that, if successful, may increase employment in the ROI (Table 4.1). Most of these parks are relatively new, and their potential for new job creation is unknown. The cumulative impact would depend on the total number of jobs created throughout the region and on the type of wages paid by the industries that located there. If all of these parks developed rapidly within the next 10 years, there could be a large cumulative impact on employment and income. However, such an impact is not likely to have any effect on or be effected by the proposed action.

Table 4.1. Additional industrial parks in the PORTS ROI

County	Site name	No. of acres
Jackson	Jackson Area Industrial Park	200
	Gettles Site	75
Pike	Zahn's Corner	376
	Scioto Township Industrial Park	200
Ross	Gateway	90
Scioto	New Boston	70
	Haverhill	1065
	522 Site	172

Source: Chandler 2000, Justice 2000, and ODOD 1999–2000.

4.14.5 Impacts

Potential cumulative impacts that could occur from the proposed action to implement Quadrant II corrective measures and the other actions described previously are presented in the following sections.

4.14.5.1 Land and facility use

Impacts from the other actions described in the previous sections have the potential to affect land and facility use at PORTS. However, the Quadrant II area affected by the proposed action is not in consideration for further industrial development in the short-term. Completion of corrective measures covered by this EA may in the long-term make portions of the X-701B Groundwater Plume area suitable for consideration as a site for future industrial activities.

4.14.5.2 Air quality

The proposed action would have minimal impacts on local or regional air quality. The existing air quality of the region is considered to be good and is in attainment for all of the NAAQS. Air emissions from the other actions described previously would only be expected to have minor impacts and not violate any of the NAAQS. Fugitive dust emissions from construction activities would be temporary and controlled by mitigation measures (e.g., watering and covering exposed soil piles).

4.14.5.3 Soil and water resources

Construction-related disturbance of natural soils would occur under the proposed action. These types of impacts would be temporary and mitigated through the use of BMPs. Accidental spills and releases of hazardous materials could also potentially impact soils. Impacts to surface water and groundwater resources could also occur during construction activities, but they also would be mitigated. None of the

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actions discussed previously would be expected to have major discharges of industrial effluents that could adversely impact water resources.

4.14.5.4 Ecological resources

Construction activities associated with the proposed action could result in minor, temporary disturbance to existing habitats and biota. However, no federal- or state-listed threatened and endangered species are known to exist in the area of the proposed action. Emissions and effluents from construction and operation of the facilities to be built as part of the proposed action should not be of sufficient quantity to have major adverse impacts (e.g., stress, impairment, injury, or mortality) on existing habitats and biota. Accidental releases from ongoing and proposed operations could impact ecological resources if adequate mitigation measures were not in place and implemented.

4.14.5.5 Socioeconomics and environmental justice

No cumulative socioeconomic impacts are expected to occur from the proposed action.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires agencies to identify and address disproportionately high and adverse human health or environmental effects their activities may have on minority and low-income populations. As discussed in Sect. 3.8, only one census tract (9937) in the ROI includes a minority population, and this population is located several miles south of PORTS in the city of Portsmouth. Therefore, there would be no disproportionate impact on minority populations. Many of the tracts in the ROI meet the definition of low-income populations, especially the tracts nearest the site in Pike County. However, no disproportionately high and adverse human health or environmental impacts to these low-income populations are expected to result from the implementation of the proposed action. No cumulative environmental justice impacts would be expected to occur from the proposed action. Environmental justice and census tract data for the PORTS region are presented in Sect. 3.8.

4.14.5.6 Infrastructure and support services

No cumulative transportation impacts are expected from the proposed action. Implementation of the proposed action discussed previously would not require any major upgrades to existing transportation systems or major new construction of roads or rail facilities. A small increase in truck traffic could be expected during construction activities. A temporary increase in trucks on U.S. Route 23 and/or U.S Route 32 would occur particularly during the capping of the X-701B Holding Pond and Retention Basins. Impacts to transportation in the area would not require modification of roads or other infrastructures to accommodate additional traffic.

Associated with increases in traffic is the potential for an increased number of accidents, additional noise and air pollution, and road deterioration and damage. The increase in average daily traffic volumes could result in inconveniences for other vehicles (personal and commercial) on affected routes and connecting roads. Increased pavement deterioration and damage could increase costs associated with maintaining or resurfacing roads and highways. Although noise associated with increases in traffic is normally not harmful to hearing, increased traffic noise is considered by the public to be a nuisance. Increased accidents put an additional strain on local emergency response personnel. Increased vehicular traffic also has the greatest potential to increase air pollution in the local area because emissions from motor vehicles are poorly regulated.

4.14.5.7 Human health and accidents

Cumulative public and occupational health impacts would be expected to be equal to or less than those that currently exist in and around PORTS.

5. REGULATORY COMPLIANCE

During the NEPA process, DOE contacts the USFWS to obtain the latest information on threatened and endangered species or designated critical habitats that could occur in the vicinity of the proposed action. If DOE determines that any threatened and endangered species or critical habitat could be adversely impacted by the proposed action, informal or formal consultation with the USFWS is initiated under Section 7 of the Endangered Species Act (16 U.S.C. 1531 et seq.). Threatened and endangered species at PORTS are discussed in Sections 3.6 and 4.6.

DOE is also required under Section 106 of the NHPA to consult with the SHPO regarding the presence of archaeological and historic sites and the potential for adverse impacts at a proposed project site. Consultation with the Ohio SHPO is discussed in Section 4.7.1. Also, under the Farmland Protection Policy Act, DOE consults with the Natural Resource Conservation Service regarding the presence and future use of prime farmland soils at a proposed site. The proposed project will be conducted on land that has previously been converted from farmland to industrial during the construction of the gaseous diffusion plant in the early 1950's; therefore, the potential corrective measures being considered under the proposed action will result in no conversion of prime farmlands. As a result, the National Resource Conservation Service was not contacted concerning the proposed action.

DOE activities at PORTS are required to operate in accordance with environmental regulations established by federal and state laws, executive orders, DOE Orders, and compliance agreements. Most DOE-PORTS cleanup activities are conducted under a Consent Decree with the State of Ohio and an ACO with the Ohio EPA and U.S. EPA. While environmental restoration activities are implemented in accordance with the RCRA Corrective Action Program, the Administrative Consent Order cites CERCLA as a governing authority in addition to RCRA. CERCLA establishes many requirements for transfer of federally owned property, including property that has been contaminated or property that can be identified as uncontaminated.

Relevant DOE Orders pertain to the proposed action include DOE Order 430.1A, *Life Cycle Asset Management*; DOE Order 5400.1, *General Environmental Protection Program*; and DOE Order 5400.5, *Radiation Protection of the Public and the Environment.* Regulations implementing the CAA, CWA, NRC rules, RCRA, Safe Drinking Water Act, TSCA, Emergency Planning and Community-Right-to-Know Act, and others may apply.

The following agencies and persons listed in Table 5.1 were contacted for information and data used in the preparation of this EA (copies of correspondence are provided in Appendix A):

Table 5.1. List of Agencies and Persons Contacted

Name	Affiliation	Location	Topic
Pat Jones	Ohio Department of Natural Resources	Columbus, Ohio	Threatened and Endangered Species
Kent Kroonemeyer	U.S. Fish and Wildlife Service	Reynoldsburg, Ohio	Endangered Species Act, Section 7 Informal Consultation
David Snyder	Ohio Historic Preservation Office	Columbus, Ohio	National Historic Preservation Act, Section 106 Compliance

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APPENDIX A

COPIES OF CONSULTATION LETTERS

epartment of Energy
Portsmouth Site Office
P.O. Box 700
Piketon, Ohio 45661-0700
Phone: 740-897-5010

December 5, 2001
EM-97-0223

Mr. David Snyder
Archeology Reviews Manager
Resource Protection and Review
567 East Hudson Street
Columbus, Ohio 43211-1030

Dear Mr. Snyder:

NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE, QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT (PORTS) IN PIKETON, OHIO

As required in 36 CFR Part 800, this letter provides official notification to the Ohio Historic Preservation Office of a U.S. Department of Energy (DOE) proposed project (undertaking) at the Portsmouth Gaseous Diffusion Plant (PORTS) located at Piketon, Ohio. DOE will also prepare an Environmental Assessment (EA) for the proposed project in accordance with the National Environmental Policy Act (NEPA). The proposed action is to implement environmental corrective measures in the eastern quadrant (Quadrant II) of PORTS.

The Final Quadrant II Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) Report for PORTS was approved by Ohio EPA in March 2001. The CAS/CMS Report identified four units that required development of alternatives to address contaminants. These units are the X-720 Neutralization Pit area soils, X-701B Holding Pond and Retention Basins Soils, 7-Unit area, and X-701B Area Groundwater. In addition, several RCRA units in Quadrant II lying over contaminated groundwater plumes were integrated into the CAS/CMS process to facilitate cleanup. These units included the X-701C Neutralization Pit, the X-744Y Waste Storage Yard, the X-230J7 East Holding Pond and Oil Separation Basin.

Of these units, the X-720 Neutralization Pit area soils, the X-701C Neutralization Pit (PIK-61-12) and associated X-701A Lime House (PIK-60-12), and the X-744Y Waste Storage Yard have been remediated under earlier actions by demolishing existing contaminated structures, removing and disposing of contaminated waste and debris, neutralizing remaining contaminated soils where necessary, and backfilling and capping excavated areas as appropriate. Notification of DOE's intent to demolish the X-701C and X-701A units was provided in a letter to you dated December 27, 2000. Per your guidance, archived records including drawings and photographs of the X-701C and X-701A units are being maintained. The 7-Unit Groundwater Plume Area and the X-230J7 East Holding Pond and Oil Separation Basin corrective actions are to be accomplished in conjunction with the decontamination and decommissioning of the remainder of the plant and therefore are not part of this proposed undertaking. The X-701B Holding Pond and Retention Basins and the X-701B Area Groundwater Plume are the only remaining units in need of and available for corrective measures implementation in Quadrant II at this time.

This undertaking proposes to complete activities selected by OEPA required to implement corrective actions and supporting activities at the X-701B Holding Pond and Retention Basins and the X-701B Area Groundwater Plume. These actions could include: upgrades to groundwater treatment operations; injection of chemicals into groundwater to reactively degrade organic solvents; installation of appurtenances to facilitate aerobic or anaerobic biodegradation of organic solvents; demolition and removal of contaminated structures; implementation and maintenance of institutional controls (i.e., access restrictions, signs, fencing and groundwater monitoring); implementation of routine surveillance and maintenance activities (i.e., routine inspections of facilities and performance of preventive or corrective measures to ensure proper operation of all engineered controls); installation of appropriate coverings to isolate contamination and prevent contaminant migration; installation and development of new groundwater monitoring wells; monitoring of existing groundwater monitoring wells; monitoring, sampling, and characterization of waste soils, surface water, groundwater, and air during and after remediation to verify the effectiveness of remedial alternatives; removal of soil for treatment and disposal off-site; installation of groundwater extraction wells; treatment of contaminated water at on-site groundwater treatment units; and completion of early actions to facilitate contaminant control while long term remedial actions are being designed and developed.

One existing structure and one storage yard in Quadrant II will be removed as part of the proposed corrective measures implementation. These are the X-701E Neutralization Building (PIK-53-12) and the X-747G Precious Metal Scrap Yard. The X-701E unit was built around 1973 as a pumphouse/treatment unit near the influent to the X-701B Holding Pond. The 18' by 22' building has a steel frame with aluminum panels built on a concrete pad. The building and the treatment pond it supported were deactivated in 1988. The building has been used off and on since 1990 as a treatment unit for groundwater in the area of the X-701B Holding Pond. The X-747G Precious Metal Scrap Yard was constructed in 1976. This 25,000 ft^2 outdoor storage area is surrounded by an eight-foot, chain link, wire fence and is used for the storage of contaminated cascade scrap metal parts made of valuable alloys. (See Figure 1).

The current corrective measures plan is expected to require a cap over the X-701B Holding Pond and Retention Basins area and will necessitate demolishing the X-701E unit due to its location within the boundary of the area to be excavated and capped. The X-747G Storage Yard will need to be demolished or relocated to prevent interference with groundwater corrective measures. Because of their recent construction, the fact that they are not unique in terms of history, architecture or engineering, and the fact that they add little to the understanding of the gaseous diffusion facility, the demolition of these units will have no affect on the historical integrity of the core plant.

Two temporary treatment and support units in Quadrant II have reached the end of their operational life and are expected to be replaced in the near future. These are the X-622T Groundwater Treatment Unit and the X-624 Groundwater Treatment Unit (PIK-138-12). These replacement units will be necessary to continue to support the control and remediation of the Quadrant II groundwater plumes as required by Ohio EPA. The X-622T is a temporary, trailer mounted unit placed in operation in the early 1990's to treat groundwater pumped from the building sumps in the X-705 Decontamination Building and X-700 Cleaning Building. Other groundwater generated from non-routine activities around the plant were also occasionally treated at this unit. X-624 was constructed in the 1993-1995 timeframe to treat primarily groundwater collected from an interceptor trench running across the east side of the X-701B Groundwater Plume. This unit is a pre-fabricated steel-frame type building build on a concrete pad. Replacement units will be constructed near the current groundwater treatment units to support new treatment processes. Once the new units are operational, the old units will be demolished. The demolition of these units will have no affect on the historical integrity of the core plant.

All activities would take place within current DOE property boundaries.

The following are Section 106 requirements pertaining to the proposed activities:

DOE's designated Agency Official responsible for this planned undertaking:

Ms. Sharon Robinson, Site Manager Portsmouth Site Office
U.S. Department of Energy, PORTS
Post Office Box 700
Piketon, Ohio 45661

Area of Potential Effect:

The area in and around Quadrant II at PORTS is considered the area of potential effect (APE) for this project. The APE is within the boundaries of the PORTS operating facility (see Figure 1). None of the proposed actions will impact eligible or potentially eligible archeological sites currently identified in this quadrant of PORTS. The architectural facilities and structures potentially impacted by the proposed corrective measures implementation activities in Quadrant II of PORTS are not associated with the original and core plant (1952-1956) and are not considered to be contributing resources due to their recent construction (within the last 30 years), not being unique in terms of history, architecture or engineering, and the fact that they add little to the understanding of the PORTS facility.

Identification of Consulting Parties:

The consulting parties recommended by DOE for this project are the Ohio State Historic Preservation Office (SHPO) and the Pike County Chamber of Commerce. No prehistoric sacred sites or Native American burials are known to exist onsite or to have been excavated or removed from the DOE PORTS facility under the jurisdiction of DOE PORTS or its predecessor agencies. As a result, it is highly unlikely that any actions in the proposed area by future deed holders will impact Native American Indian tribal, religious, or cultural sites.

Public Participation:

The proposed undertaking will be addressed during the DOE public meeting tentatively scheduled for January 2002. At this meeting DOE will solicit and respond to public concerns related to this proposal.

Assignment of Section 106 Review Responsibilities:

DOE is the sole agency responsible for the Section 106 review process for this project.

Incorporation of Section 106 in Environmental Documents:

A National Environmental Policy Act review of the Quadrant II Corrective Measures Implementation Program at the Portsmouth Gaseous Diffusion Plant has been conducted. A draft Environmental Assessment (EA) is being prepared. When completed, this document will address Section 106 requirements.

DOE PORTS has determined that the proposed project would have no effect on historical resources included or eligible for inclusion in the National Register of Historic Places (NRHP). The project would include the demolition of minor support structures associated with the Portsmouth Gaseous Diffusion Plant that were constructed 20 – 40 years after the initial construction of the PORTS core plant. These proposed activities would not have an effect on the historical integrity of the PORTS core plant.

DOE PORTS requests your concurrence with DOE's determination that the historical integrity of the PORTS Gaseous Diffusion Plant will not be affected by the proposed undertaking and no further Section 106 consultation is required. Please provide written conformation of your concurrence.

If you have any questions or require additional information related to this proposed process please call Ray Moore at (865) 576-9574 or Kristi Wiehle at (740) 897-5020.

Sincerely,

Harold J. Monroe III
Acting Site Manager
Portsmouth Site Office

Enclosure

cc:
Tom McCulloch
Lois Thompson, EH-232, HQ/FO
Skip Gosling, HR-76, HQ/FORS
Bob Poe, SE-30/ORO
David Allen, SE-32/ORO
Ray T. Moore, SE-32/ORO
Ray Miskelley, CC-10/ORO
Robert Brown, AU-60/ORO
Gil Drexel, BJC/PORTS

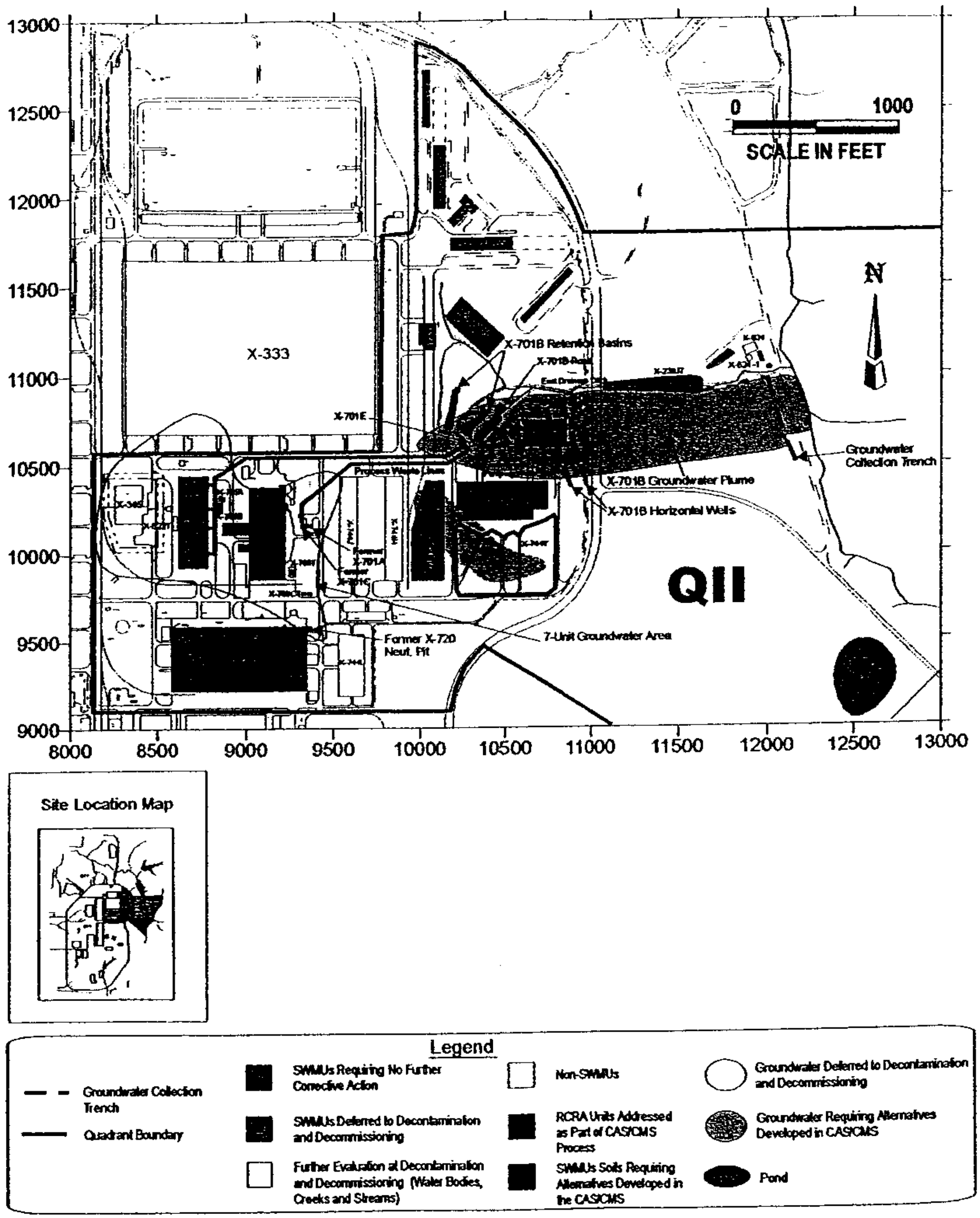

Fig. 1

Area of Potential Effect
Quadrant II Corrective Measures

DOCUMENT ID:	DRAWING ID:	DRAWING DATE:
QII SHPO Notification	Fig 1 QIIEA/SHPO.cdr	October 25, 2001 SLC

Ohio Historic Preservation Office

567 East Hudson Street
Columbus, Ohio 43211-1030
614/ 298-2000 Fax: 614/ 298-2037

Visit us at www.ohiohistory.org/resource/histpres/

OHIO HISTORICAL SOCIETY
SINCE 1885

January 30, 2002

Harold J. Monroe, III, Site Manager
U.S. Department of Energy, PORTS
Portsmouth Site Office
P.O. Box 700
Piketon, OH 45661

Re: Construction of X-701B Holding Pond and Retention Basins
Portsmouth Gaseous Diffusion Plant, Pike County, Ohio

Dear Mr. Monroe,

This is in response to correspondence from your office dated December 5, 2001 (received December 10) regarding the above referenced project. The comments of the Ohio Historic Preservation Office (OHPO) are submitted in accordance with provisions of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]); the Department of Energy serves as the lead federal agency.

The project involves construction of three small basins as part of the 7 Unit groundwater treatment activities. The basins are in an area that has been severely disturbed by previous activities. We agree that there will be no effect to the structures and the qualities that give significance to this historic property. We concur with your finding that there will be no historic properties affected by the proposed modifications to the groundwater treatment facility. We recommend that you maintain a file for this undertaking including mapping and photographs showing the setting before and after the construction. No further coordination with this office is necessary for this project unless there is a change in the scope of work.

Any questions concerning this matter should be addressed to David Snyder at (614) 298-2000, between the hours of 8 am. to 5 pm. Thank you for your cooperation.

Sincerely,

David Snyder

David Snyder, Archaeology Reviews Manager
Resource Protection and Review

DMS/ds

xc: Ray T. Moore, DOE - Oak Ridge, P.O. Box 2001, Oak Ridge, TN 37831

Department of Energy
Portsmouth Site Office
P.O. Box 700
Piketon, Ohio 45661-0700
Phone: 740-897-5010

October 25, 2001
EM-97-0184

RECEIVED

Mr. Kent Kroonemeyer
Field Supervisor
U.S. Fish and Wildlife Service
6950-H Americana Parkway
Reynoldsburg, Ohio 43068-4127

Dear Mr. Kroonemeyer:

INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT FOR THE QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT

The U.S. Department of Energy (DOE) is preparing an Environmental Assessment (EA) for the Portsmouth Gaseous Diffusion Plant (PORTS) located at Piketon, Ohio, in accordance with the National Environmental Policy Act (NEPA). The proposed action is to implement environmental corrective measures in the eastern quadrant (Quadrant II) of PORTS.

The Final Quadrant II Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) Report for PORTS was approved by Ohio EPA in March, 2001. The CAS/CMS Report identified four units that required development of alternatives to address contaminants. Alternatives were developed for the X-720 Neutralization Pit area soils, X-701B Holding Pond and Retention Basins Soils, 7-Unit area, and X-701B Area Groundwater.

In addition, because of the problems associated with regulatory remedies at several RCRA units which lie over contaminated groundwater plumes, a Director's Final Findings and Orders was journalized on March 18, 1999, to integrate these units into the CAS/CMS process. In Quadrant II, the units are the X-701C Neutralization Pit, the X-744Y Waste Storage Yard, the X-230J7 East Holding Pond and Oil Separation Basin, and the X-701B Holding Pond.

This project proposes to complete activities selected by OEPA required to implement corrective actions. These actions could include: upgrades to groundwater treatment operations; injection of chemicals into groundwater to reactively degrade organic solvents; installation of appurtenances to facilitate aerobic or anaerobic biodegradation of organic solvents; demolition and removal of contaminated structures; implementation and maintenance of institutional controls (i.e., access restrictions, signs, fencing and groundwater monitoring); implementation of routine surveillance and maintenance activities (i.e., routine inspections of facilities and performance of preventive or corrective measures to ensure proper operation of all engineered controls); installation of appropriate coverings to isolate contamination and prevent contaminant migration; installation and development of new groundwater monitoring wells; monitoring of existing groundwater monitoring wells; monitoring, sampling, and characterization of waste soils, surface water, groundwater, and air during and after remediation to verify the effectiveness of remedial appropriate coverings to isolate contamination and prevent contaminant migration; installation and development of new groundwater monitoring wells; monitoring of existing groundwater monitoring wells; monitoring, sampling, and characterization of waste soils, surface water, groundwater, and air during and after remediation to verify the effectiveness of remedial alternatives; removal of soil for treatment and disposal off-site; installation of groundwater extraction wells; treatment of contaminated water at on-site groundwater treatment facilities; and completion of early actions to facilitate contaminant control while long term remedial actions are being designed and developed.

Alternatives to the proposed actions which would be considered include the "No Action Alternative" required by NEPA. All activities would take place within current DOE property boundaries.

Our last correspondence with you regarding activities at PORTS was your letter of May 7, 2001, regarding proposed winterization activities including the installation of an approximate five-mile natural gas line to the plant. Your review of that proposed action and your assessment of potential impacts was very helpful in the preparation of the EA for that project.

This letter is intended to serve as informal consultation under Section 7 of the Endangered Species Act. In this regard, DOE requests an updated list of protected species and habitats on the DOE/PORTS property and solicits your recommendations and comments about the potential effects of this proposed action. Your input will be used in the preparation of the EA. Because of the urgent need to initiate these corrective measures as early as possible, we would appreciate a reply to this letter by November 30, 2001.

If you need further information on this request, please do not hesitate to call me at (740) 897-2001.

Sincerely,

Harold J. Monroe, III
Acting Site Manager
Portsmouth Site Office

cc:
D. Allen, SE-30-1/ORO
G. Hartman, EM-912/ORO
Administrative Records
G. Drexel, BJC/PORTS

DOE F 1325.8
(4/93)

United States Government

Department of Energy

Oak Ridge Operations Office

memorandum

DATE: January 4, 2002

REPLY TO
ATTN OF: EM-97:Monroe

SUBJECT: **ENDANGERED SPECIES COMMENTS**

TO: Katy Kates, Procurement Contracts Division, AD-42/ORO

Attached for your information and use is a letter from the United States Department of the Interior Fish and Wildlife Service.

Should you have any questions or need additional information, please contact me at (740) 897-2001.

Harold J. Monroe III
Acting Site Manager
Portsmouth Site Office

Attachment

cc w/attachment:
Ken Dewey, Ohio EPA
T.J. Justice, Ohio Governor's Office
Greg Simonton, SODI
Ray Miskelley, CC-10/ORO
David Queen, EM-90/ORO
John Harmon, BJC/PORTS
Rosemary Richmond, BJC/PORTS
Sandy Childers, BJC/PORTS
Russ Vranicar, EM-97/PORTS
Kristi Wiehle, EM-97/PORTS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
6950 Americana Parkway, Suite H
Reynoldsburg, Ohio 43068-4132

November 27, 2001

Harold J. Monroe, III, Acting Site Manager
Portsmouth Site Office
Department of Energy
P.O. Box 700
Piketon, OH 45661-0700

Dear Mr. Monroe:

This responds to your letter of October 25, 2001 requesting a list of Federally listed endangered and threatened species that may occur in the vicinity of the Portsmouth Gaseous Diffusion Plant, Pike County, Ohio.

ENDANGERED SPECIES COMMENTS: This project lies within the range of the Indiana bat (E), and the timber rattlesnake (PC), Federally listed endangered (E) or proposed candidate (PC) species.

ENDANGERED SPECIES COMMENTS: Summer habitat requirements for the Indiana bat are not well defined, but the following are thought to be of importance:

(1) dead trees and snags along riparian corridors especially those with exfoliating bark or cavities in the trunk or branches which may be used as maternity roost areas;
(2) live trees (such as shagbark hickory) which have exfoliating bark;
(3) stream corridors, riparian areas, and nearby wood lots which provide forage sites.

We recommend that if potential bat roost trees with the above characteristics are encountered in the project area, they and surrounding trees should be saved wherever possible. If they must be cut, they should <u>not</u> be cut between April 15 and September 15.

If potential bat roost trees are present, and if the above time restriction is unacceptable, mist net or other surveys should be conducted to determine if bats are present. The survey should be designed and conducted in coordination with the endangered species coordinator for this office, Ms. Angela Boyer. The survey should be conducted in June or July, the period when peak bat populations could be expected.

ENDANGERED SPECIES COMMENTS: The timber rattlesnake is a large shy rattlesnake that is declining throughout its national range. No Federal listing status has been assigned to this species. Instead, the U.S. Fish and Wildlife Service has initiated a pre-listing Conservation Action Plan to support state and local conservation efforts. Your proactive efforts to conserve this species now may help avoid the need to list the species under the Endangered Species Act in the future. The timber rattlesnake is protected throughout much of its range and listed as endangered by the State of Ohio. Due to its rarity and reclusive nature, we encourage early project coordination to avoid potential impacts to timber rattlesnakes and their habitat.

In Ohio, the timber rattlesnake is restricted to the un-glaciated Allegheny plateau and utilizes specific habitat types depending upon season. Winters are spent in dens usually associated with high, dry ridges. These dens may face any direction, but southeast to southwest are most common. Such dens usually consist of narrow crevices in the bedrock. Rocks may or may not be present on the surface. From these dens timber rattlesnakes radiate throughout the surrounding hills and move distances as great as 4.5 miles. In the fall, timber rattlesnakes return to the same den. Intensive efforts to transplant timber rattlesnakes have not been successful. Thus protection of the winter dens is critical to the survival of this species. Some project management ideas include the following:

1) At a minimum, project evaluations should contain delineations of timber rattlesnake habitat within project boundaries. Descriptions should indicate the quality and quantity of timber rattlesnake habitat (den sites, basking sites, foraging area, other) that may be affected by the project.

2) In cases where timber rattlesnakes are known to occur or where potential habitat is rated moderate to high, timber rattlesnake surveys may be necessary. If surveys are conducted it may be helpful to confer with local resource agency personnel who may know of timber rattlesnake sightings or reliable local residents with information. Local herpetologists may have knowledge of historical populations as well as precise knowledge of the habits and habitats of local timber rattlesnakes. Surveys should be performed during the periods of spring emergence from dens (usually a narrow window in April or May) and throughout the active season until October. The species is often easiest to locate during the summer months when pregnant females seek out open areas in early morning, especially after cool evenings.

3) In portions of projects where timber rattlesnakes will be affected, clearing and construction activities should occur at distances greater than 100 feet from known dens. Most importantly tops of ridges and areas of exposed rock should be avoided.

4) In areas where timber rattlesnake dens are known or likely to exist, maintenance activities (mowing, cutting, burning, etc.) should be conducted from November 1 to March 1 when timber rattlesnakes are hibernating.

Two divisions of the Ohio Department of Natural Resources, the Division of Wildlife (614-265-6300) and the Division of Natural Areas and Preserves (614-265-6472), maintain lists of plants and animals of concern to the State of Ohio. If you have not already done so, you may wish to contact these agencies to obtain site-specific information on species of state concern.

If you have questions or we may be of further assistance in this matter, please contact Mr. Bill Kurey of this office at 614-469-6923 ext. 14.

Sincerely,

Kenneth Lammers

Kenneth Lammers
Acting Supervisor

cc: R. Sanders, ODOW

received
12-3-01

epartment of Energy
Portsmouth Site Office
P.O. Box 700
Piketon, Ohio 45661-0700
Phone: 740-897-5010

October 25, 2001
EM-97-0183

RECEIVED
NOV - 6

Ms. Patricia Jones
Ohio Department of Natural Resources
Heritage Program
1889 Fountain Square, Bldg. F-1
Columbus, Ohio 43224

Dear Ms. Jones:

LETTER OF CONSULTATION FOR THE QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION AT THE PORTSMOUTH GASEOUS DIFFUSION PLANT

The U.S. Department of Energy (DOE) is preparing an Environmental Assessment (EA) for the Portsmouth Gaseous Diffusion Plant (PORTS) located at Piketon, Ohio, in accordance with the National Environmental Policy Act (NEPA). The proposed action is to implement environmental corrective measures in the eastern quadrant (Quadrant II) of PORTS.

The Final Quadrant II Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) Report for PORTS was approved by Ohio EPA in March, 2001. The CAS/CMS Report identified four units that required development of alternatives to address contaminants. Alternatives were developed for the X-720 Neutralization Pit area soils, X-701B Holding Pond and Retention Basins Soils, 7-Unit area, and X-701B Area Groundwater.

In addition, because of the problems associated with regulatory remedies at several RCRA units which lie over contaminated groundwater plumes, a Director's Final Findings and Orders was journalized on March 18, 1999, to integrate these units into the CAS/CMS process. In Quadrant II, the units are the X-701C Neutralization Pit, the X-744Y Waste Storage Yard, the X-230J7 East Holding Pond and Oil Separation Basin, and the X-701B Holding Pond.

This project proposes to complete activities selected by OEPA required to implement corrective actions. These actions could include: upgrades to groundwater treatment operations; injection of chemicals into groundwater to reactively degrade organic solvents; installation of appurtenances to facilitate aerobic or anaerobic biodegradation of organic solvents; demolition and removal of contaminated structures; implementation and maintenance of institutional controls (i.e., access restrictions, signs, fencing and groundwater monitoring); implementation of routine surveillance and maintenance activities (i.e., routine inspections of facilities and performance of preventive or corrective measures to ensure proper operation of all engineered controls); installation of appropriate coverings to isolate contamination and prevent contaminant migration; installation and development of new groundwater monitoring wells; monitoring of existing groundwater monitoring wells; monitoring, sampling, and characterization of waste soils, surface water, groundwater, and air during and after remediation to verify the effectiveness of remedial alternatives; removal of soil for treatment and disposal off-site; installation of groundwater extraction wells; treatment of contaminated water at on-site groundwater treatment facilities; and completion of early actions to facilitate contaminant control while long term remedial actions are being designed and developed.

Alternatives to the proposed actions which would be considered include the "No Action Alternative" required by NEPA. All activities would take place within current DOE property boundaries.

This letter is intended to serve as informal consultation regarding protected or rare species that may be on or near the site. In this regard, DOE requests an updated list of protected species and habitats on the DOE/PORTS property and solicits your recommendations and comments about the potential effects of this proposed action.

Our last correspondence with you regarding activities at PORTS was your letter of May 7, 2001, regarding a proposed winterization activities including the installation of an approximate five-mile natural gas line to the plant. Your review of that proposed action and your assessment of potential impacts was very helpful in the preparation of the EA for that project.

Your input regarding this new proposed action will be used in the preparation of the subject EA. Because of the urgent need to initiate these corrective measures as early as possible, we would appreciate a reply to this letter by November 30, 2001.

If you need further information on this request, please contact Kristi Wiehle of my staff at (740) 897-5020.

Sincerely,

R. J. Hanican FOR

Harold J. Monroe, III
Site Manager
Portsmouth Site Office

cc:
D. Allen, SE-30/ORO
G. Hartman, EM-91/ORO
Administrative Records
G. Drexel, BJC/PORTS

APPENDIX B

VERTEBRATE SPECIES OBSERVED AT PORTS

Table B.1. Vertebrate species observed on the reservation of the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Scientific name	Common name	Scientific name	Common name
Mammals			
Blarina brevicauda	short-tailed shrew	*Odocoileus virginianus*	white-tailed deer
Bos taurus	Cattle	*Ondatra zibethicus*	muskrat
Canis familiaris	Dog	*Peromyscus leucopus*	white-footed mouse
Didelphis virginiana	Opossum	*Peromyscus maniculatus*	deer mouse
Eptesicus fuscus	big brown bat	*Pipistrellus subflavus*	eastern pipistrelle
Felis domestica	house cat	*Procyon lotor*	raccoon
Glaucomys volans	southern flying squirrel	*Reithrodontomys humulis*	eastern harvest mouse
Lasiurus borealis	red bat	*S. carolinensis*	gray squirrel
Marmota monax	Woodchuck	*Sciurus carolinensis*	fox squirrel
Microtus pennsylvanicus	meadow vole	*Sorex cinereus*	masked shrew
Mus musculus	house mouse	*Sylvilagus floridans*	eastern cottontail rabbit
Mustela frenata	long-tailed weasel	*Tamius striatus*	eastern chipmunk
Myotis lucifugus	little brown bat	*Urocyon cinereoargenteus*	gray fox
Myotis septentrionalis	northern long ear bat	*Vulpes vulpes*	red fox
Reptiles and Amphibians			
Bufo americanus	American toad	*Hyla c. crucifer*	northern spring peeper
Bufo woodhousei fowleri	Fowler's toad	*Natrix s. sipedon*	northern water snake
Chelydra serpentina	snapping turtle	*Opheodrys aestivus*	rough green snake
Chrysemys picta	midland painted turtle	*Rana catesbeiana*	bullfrog
Columber c. constrictor	northern black racer	*Rana p. pipiens*	northern leopard frog
Desmognathus f. fuscus	northern dusky salamander	*Terrapene c. carolina*	eastern box turtle
Elaphe o. obsoleta	black rat snake	*Thamnophis s. sirtalis*	eastern garter snake
Graptemys geographica	map turtle	*Trionyx s. spinifer*	eastern spiny softshell turtle
Heterodon playtrhinos	eastern hognose snake		
Birds			
Accipiter cooperii	Cooper's hawk	*Guiraca caerulea*	blue grosbeak
Accipiter striatus	sharp-shinned hawk	*Hirundo rustica*	barn swallow
Actitis macularia	spotted sandpiper	*Hylocichla guttata faxoni*	hermit thrush
Agelaius phoeniceus	red-winged blackbird	*Hylocichla mustelina*	wood thrush
Aix sponsa	wood duck	*Icteria virens virens*	yellow-breasted chat
Ammodramus henslowii	Henslow's sparrow	*Icterus galbula*	northern oriole
Ammodramus savannarum	grasshopper sparrow	*Junco hyemalis*	dark-eyed junco
Anas crecca	green-winged teal	*Lophodytes cucullatus*	hooded meganser
Anas discors	blue-winged teal	*Megaceryle alcyon*	belted kingfisher
Anas platyrhynchos	Mallard	*Melanerpes erythrocephalus*	red-headed woodpecker
Anas rubripes	black duck	*Meleagris gallopauo*	wild turkey
Anas strepera	Gadwall	*Melospiza georgiana*	swamp sparrow
Archilochus colubris	ruby-throated hummingbird	*Melospiza melodia*	song sparrow
Ardea herodias	great blue heron	*Mimus polyglottos*	mockingbird

Scientific name	Common name	Scientific name	Common name
Birds			
Aythya affinis	lesser scaup	*Molothus ater ater*	brown-headed cowbird
Aythya collaris	ring-necked duck	*Myiarchus crinitus*	great crested flycatcher
Bombycilla cedrorum	cedar waxwing	*Oporornis formosus*	Kentucky warbler
Bonasa umbellus	ruffed grouse	*Otus asio*	screech owl
Botarus lentiginosus	American bittern	*Parus atricapillus*	black-capped chickadee
Bucephala albeola	bufflehead	*Parus bicolor*	tufted titmouse
Buteo jamaicensis	red-tailed hawk	*Parus carolinensis*	Carolina chickadee
Butorides virescens	green heron	*Passerculus sandwichensis*	savannah sparrow
Calidres alpina	dunlin	*Passerina cyanea*	indigo bunting
Calidres melanotos	pectoral sandpiper	*Philohela minor*	American woodcock
Calidres minutilla	least sandpiper	*Pipilo erythropthalmus*	rufous-sided towhee
Calidris pusillus	semipalmated sandpiper	*Piranga olivacea*	scarlet tanager
Capodacus purpureus	purple finch	*Piranga rubra*	summer tanager
Caprimulgus vociferus	whippoorwill	*Podilymbus podiceps*	pied-billed grebe
Cardinalis cardinalis	cardinal	*Polioptila caerulea caerulea*	blue-gray gnatcatcher
Cathartes aura	turkey vulture	*Progne subis*	purple martin
Centurus carolinus	red-bellied woodpecker	*Regulus calendula calendula*	ruby-crowned kinglet
Certhia familiaris	brown creeper	*Regulus satrapa satrapa*	golden-crowned kinglet
Chaetura pelagica	chimney swift	*Sayornis phoebe*	eastern phoebe
Charadrius vociferus	killdeer	*Seiurus aurocapillus*	ovenbird
Circus cyaneus	marsh hawk	*Siala sialis*	eastern bluebird
Coccyzus americanus	yellow-billed cuckoo	*Sitta canadensis*	red-breasted nuthatch
Coccyzus erythropthalamus	black-billed cuckoo	*Sitta carolinensis*	white-breasted nuthatch
Colaptes aurantus	common flicker	*Sphyrapicus varius*	yellow-bellied sapsucker
Colinus virginianus	bobwhite	*Spinus pinus*	pine siskin
Columba livia	rock dove	*Spinus tristis*	American goldfinch
Contopus virens	eastern wood pewee	*Spizella arborea*	tree sparrow
Corvus brachyrhynchos	common crow	*Spizella passerina*	chipping sparrow
Cyanocitta cristata	blue jay	*Spizella pusilla*	field sparrow
Dendrocopos pubescens	downy woodpecker	*Sturnella magna magna*	eastern meadowlark
Dendrocopos villosus	hairy woodpecker	*Sturnus vulgaris vulgaris*	starling
Dendroica coronata coronata	yellow-rumped warbler	*Thryothorus ludovicianus*	Carolina wren
Dendroica discolor	prairie warbler	*Toxostoma rufum rufum*	brown thrasher
Dendroica petechia	yellow warbler	*Tringa flavipes*	lesser yellowlegs
Dendroica virens	black-throated green warbler	*Tringa melanoleucus*	greater yellowlegs
Drycopus pileatus	pileated woodpecker	*Turdus migratorius*	American robin
Dumetella carolinensis	gray catbird	*Tyrannus tyrannus*	eastern kingbird
Empidonax traillii	willow flycatcher	*Vermivora pinus*	blue-winged warbler
Empidonax virescens	acadian flycatcher	*Vireo griseus*	white-eyed vireo
Falco sparverius	American kestrel	*Vireo olivaceus*	red-eyed vireo
Fulica americanus	American coot	*Zenaida macroura*	mourning dove
Gavia immer	common loon	*Zonotrichia albicollis*	white-throated sparrow
Geothlypis trichas	common yellowthroat	*Zonotrichia leucophrys*	white-crowned sparrow

Scientific name	Common name	Scientific name	Common name
Fish (Note: Fish species were observed in the streams in and immediately surrounding the Plant.)			
Ambloplities rupestris	rock bass	*Lythrurus umbratilius*	redfin shiner
Ameiurus natalis	yellow bullhead	*Maxostoma duquesnei*	black redhorse
Aplodinatus grunniens	freshwater drum	*Micropterus dolmieui*	smallmouth bass
Campostoma anomalum	central stoneroller	*Micropterus punctulatus*	spotted bass
Catostomus commersoni	white sucker	*Micropterus salmoides*	largemouth bass
Cyprinella spiloptera	spotfin shiner	*Minytrema melanops*	spotted sucker
Cyprinella whippplei	steelcolor shiner	*Moxostoma erythrurum*	golden redhorse
Cyprinus carpio	common carp	*Moxostoma macrolepidotum*	shorthead redhorse
Dorosoma cepedianum	gizzard shad	*Notropis atherinoides*	emerald shiner
Esox americanus vermiculatus	grass pickerel	*Notropis buccatus*	silverjaw minnow
Etheostoma blennoides	greenside darter	*Notropis rubellus*	rosyface shiner
Etheostoma caeruleum	rainbow darter	*Notropis stramineus*	sand shiner
Etheostoma flabellare	fantail darter	*Noturus flavus*	stonecat madtom
Etheostoma nigrum	Johnny darter	*Noturus miuris*	brindled madtom
Etheostoma spectabile	orangethroat darter	*Percina caprodes*	logperch
Etheostoma zonale	banded darter	*Percina maculata*	blackside darter
Fundulus notatus	blackstripe topminnow	*Percina sciera*	dusky darter
Hypentelium nigricans	northern hogsucker	*Percopsis omiscomaycus*	trout-perch
Ictaluris punctatus	channel catfish	*Phenacobius mirabilis*	suckermouth minnow
Labidesthes sicculus	brook silverside	*Phoxinus erythrogaster*	southern redbelly dace
Lepisosteus osseus	longnose gar	*Pimephales notatus*	bluntnose minnow
Lepomis cyanellus	green sunfish	*Pimephales vigilax*	bullhead minnow
Lepomis macrochirus	Bluegill	*Pomoxis annularis*	white crappie
Lepomis megalotis	longear sunfish	*Rhinichthys atratulus*	blacknose dace
Luxilus chrysocephalus	striped shiner	*Semotilus atromaculatus*	creek chub
Lythrurus ardens	rosefin shiner	*Stizostedion canadense*	sauger
Lythrurus umbratilis	redfin shiner	*Stizostedion vitreum*	walleye

Sources:

U.S. Department of Energy. 1994. *Baseline Ecological Risk Assessment, Portsmouth Gaseous Diffusion Plant, Piketon, Ohio.* Volume 3: Appendices C–E. DOE/OR/11-1316/V3&D1. 0-04-04/32.010.

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APPENDIX C

ARCHAEOLOGICAL AND HISTORICAL ARCHITECTURAL RESOURCES

Table C.1. PORTS archaeological resources that do not meet the NRCE

OAI/OHI No.	Quadrant	Temporal affiliations	Site name
33 Pk 186	I	Unassigned Prehistoric	Lithic Scatter
33 Pk 187	I	Historic (ca. 1915–1951)	Farmstead Remnant
33 Pk 188	I	Historic (post 1952)	Worker Barracks
33 Pk 189	IV	Unassigned Prehistoric/Historic (post 1952)	Isolated Find & Tower Platform
33 Pk 190	I	Historic (post 1952)	Radio Tower Base
33 Pk 191	I	Historic (ca. 1830s–present)	Open Dump
33 Pk 192	I	Historic (ca. 1900–present)	Open Dump
33 Pk 196	I	Historic (ca. 1952–present)	Culvert/Drain Pipes
33 Pk 198	IV	Unassigned Prehistoric	Isolated Find
33 Pk 199	IV	Historic (ca. 1820–present)	Isolated Find
33 Pk 200	IV	Historic (ca. 1820–present)	Historic Scatter
33 Pk 201	IV	Historic (ca. 1890–present)	Isolated Find
33 Pk 202	IV	Historic (ca. 1934–present)	Historic Scatter
33 Pk 204	IV	Unassigned Prehistoric	Isolated Find
33 Pk 205	IV	Unassigned Prehistoric	Isolated Find
33 Pk 206	II	Unassigned Prehistoric	Lithic Scatter
33 Pk 207	II	Unassigned Prehistoric	Isolated Find
33 Pk 208	II	Unassigned Prehistoric	Isolated Find
33 Pk 209	I	Historic (ca. 1933–1964)	Historic Scatter
33 Pk 215	IV	Historic (ca. 1820–present)	Open Dump
33 Pk 216	IV	Historic (ca. 1879–present)	Open Dump
33 Pk 219	IV	Historic (post 1952)	Old Firing Range

Source: Schweikart et al. 1997.

Table C.2. PORTS archaeological resources recommended for Phase II assessments to determine if they meet the NRCE

OAH/OHI No.	Quadrant	Temporal affiliations	Site name
33 Pk 184	I	Historic (ca. 1820–present)	Davis Farmstead
33 Pk 185	I	Historic (ca. 1900–present)	South Shyville Farmstead
33 Pk 193	I	Historic (ca. 1820–present)	Iron Wheel Farmstead
33 Pk 194	II	Historic (ca. 1820–present)	North Shyville Farmstead
33 Pk 195	I	Historic (ca. 1820–present)	Beaver Road Farmstead
33 Pk 197	II	Historic (ca. 1951)	Dutch Run Road Farmstead
33 Pk 203	IV	Historic Farmstead (ca. 1820–present)	Ruby Hollow Farmstead
33 Pk 206	II	Historic (ca. 1820–present)	Terrace Farmstead
33 Pk 210	I	Unassigned Prehistoric	Southview Site (lithic scatter)
33 Pk 211	IV	Historic (1890–1964)	Bamboo Farmstead
33 Pk 212	IV	Historic (ca. 1931–present)	Railside Farmstead
33 Pk 213	IV	Historic (ca. 1820–present)	Log Pen Farmstead
33 Pk 217	IV	Historic (ca. 1820–present)	Stockdale Road Dairy
33 Pk 218 (PIK-205-12)	IV	Historic (ca. 1820–present)	Cannett Farmstead

Source: Schweikart et al. 1997

Table C.3. PORTS archaeological and architectural historic resources to which the NRCE have not been applied

OAI/OHI No.	Quadrant	Temporal affiliations	Site name
33 Pk 189 (PIK-206-9)	II	Historic (ca. 1790–present)	Mount Gilead Cemetery and Chapel Remnant
33 Pk 214 (PIK-207-12)	IV	Historic (ca. 1877–mid-20th century)	Holt Cemetery

Source: Schweikart et al. 1997.

Table C.4. Architectural resources evaluated in the DRAFT PORTS Cultural Resources Survey

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-45-12	Cooling Tower	II	1976	3	Heat Exchanging Structure
PIK-46-12	Cooling Tower and Uncovered Extension Basin	II	1954–1955	2	Heat Exchanging Structure
PIK-47-12	Recirculating Water Pump House	II	1953–1954	2	Mechanical Building
PIK-48-12	Cooling Tower and Uncovered Extension Basin	II	1954–1955	2	Heat Exchanging Structure
PIK-49-12	Cooling Tower	II	1978	3	Heat Exchanging Structure
PIK-50-12	Feed Vaporization and Sampling Facility	II	1981	3	Process Building
PIK-51-12	East Groundwater Treatment Facility	II	1994–1995	3	Mechanical Building
PIK-52-12	Bulk Storage Building–Non-UEA	II	1956	2	Warehouse
PIK-53-12	Neutralizing Building	II	1973	3	Mechanical Building
PIK-54-12	Bulk Storage Building	II	1953	2	Warehouse
PIK-55-12	Bulk Storage Building	II	1953	2	Warehouse
PIK-56-12	Undocumented Guard Post	II	ca. 1952–1960	2	Booth
PIK-57-12	Personnel Monitoring Building	II	1955	2	Booth
PIK-58-12	Maintenance Building	II	1957	2	Warehouse
PIK-59-12	Maintenance and Stores Warehouse	II	ca. 1983	3	Warehouse
PIK-60-12	Lime House	II	1955	2	Mechanical Building
PIK-61-12	Neutralizing Pit	II	1953	2	Basin
PIK-62-12	Converter Shop and Cleaning Facility	II	1955	2	Work Building
PIK-63-12	Water Deionization Facility	II	1955	2	Mechanical Building
PIK-64-12	Air Conditioning Equipment Building	II	1975	3	Mechanical Building
PIK-65-12	Decontamination Building	II	1955	2	Work Building
PIK-66-12	Heating Booster Pump Building	II	1983	3	Mechanical Building
PIK-67-12	Special Nuclear Material Storage Building	II	1980	3	Bunker Warehouse
PIK-68-12	Radio Base Station Building	II	1978	3	Mechanical Building
PIK-69-12	Elevated Water Tank	II	1960	3	Elevated Cylinder Tank
PIK-70-12	Paint and Oil Storage Building	II	1980	3	Warehouse
PIK-71-12	Maintenance and Stores Building	II	1954	2	Work Building
PIK-72-12	Maintenance and Stores Gas Manifold Shed	II	1954	2	Covered Platform
PIK-73-12	North Portal and Shelter	I	1955	2	Booth
PIK-74-12	South Portal and Shelter	I	1955	2	Booth
PIK-75-12	Oil Drum Storage Facility	I	1954	2	Covered Platform
PIK-76-12	Gas Cylinder Storage Facility	I	1954	2	Covered Platform
PIK-77-12	Materials Receiving and Inspection	I	1954	2	Warehouse
PIK-78-12	Indoor Firing Range	I	ca. 1980–1985	3	Enclosed Firing Range Building
PIK-79-12	Guard Headquarters	I	1954, 1991	2	Office Building

Table C.4 (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-80-12	Tactical Response Station	I	1955	2	Garage
PIK-81-12	Mobile Equipment Maintenance Shop	I	1953	2	Garage
PIK-82-12	Garage Storage Building	I	ca. 1953	2	Storage Shed
PIK-83-12	Auxiliary Office Building	I	1954	2	Warehouse
PIK-84-12	Plant Control Facility and Emergency Communications Antenna	I	ca. 1952–1955	2	Bunker Office Building
PIK-85-12	Process Monitoring Building	I	ca. 1954	2	Mechanical Building
PIK-86-12	Lumber Storage Facility	I	ca. 1953–1956	2	Covered Platform
PIK-87-12	Technical Service Building	I	1953, 1975	2	Laboratory Building
PIK-88-12	Explosion Test Facility	I	1956	2	Mechanical Building
PIK-89-12	Technical Service Gas Manifold Shed	I	ca. 1955	2	Covered Platform
PIK-90-12	Cafeteria	I	1954	2	Cafeteria
PIK-91-12	Health Service Center	I	1954	2	Medical Building
PIK-92-12	Exchange Telephone Building	I	1954	2	Office Building
PIK-93-12	Air Conditioning Equipment Building	I	1958	3	Mechanical Building
PIK-94-12	Administration Building	I	1954	2	Office Building
PIK-95-12	Personnel Monitoring Trailer	I	1975	3	Mobile Home
PIK-96-12	Chemical Engineering Building	I	1954	2	Laboratory Building
PIK-97-12	Mechanical Test Building	I	1954	2	Mechanical Building
PIK-98-12	Steam Plant	I	1954, 1996	2	Heating Plant Structure
PIK-99-12	Steam Plant Shop Building	I	1981	3	Garage
PIK-100-12	Coal Pile Runoff Treatment Facility	I	1984	3	Mechanical Building
PIK-101-12	Recirculating Water Pump House	I	1954	2	Mechanical Building
PIK-102-12	Cooling Tower	I	1954	2	Heat Exchanging Structure
PIK-103-12	Interplant Portal	I	1985	4	Booth
PIK-104-12	Maintenance, Stores, and Training Facility	I	1985	4	Office Building, Multi-level
PIK-105-12	Plant Emergency Operations Center	I	ca. 1980–1985	4	Office Building
PIK-106-12	Fire Station	I	1981	4	Emergency Vehicle Garage
PIK-107-12	Data Processing Building	I	1984	4	Office Building
PIK-108-12	Administrative Portal - Pedestrian	I	1985	4	Booth
PIK-109-12	Administration Building	I	1981	4	Office Building
PIK-110-12	Electronic Maintenance Facility	I	ca. 1980–1985	4	Office Building
PIK-111-12	Cooling Tower Pump House	I	1984	4	Mechanical Building
PIK-112-12	Cooling Tower and Valve House	I	1984	4	Heat Exchanging Structure
PIK-113-12	Undocumented Guard Booth	I	ca. 1960–1980	3	Booth
PIK-114-12	GCEP Process Building #2	I	1979–1985	4	Process Building
PIK-115-12	GCEP Process Support Building	I	1983	4	Office Building

Table C.4 (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-116-12	GCEP Process Building #1	I	1979–1985	4	Process Building
PIK-117-12	GCEP Transfer Corridor	I and III	1983	4	Mechanical Corridor
PIK-118-12	Fire Water Pump House	I	ca. 1980–1985	4	Mechanical Building
PIK-119-12	Sanitary Water Storage Tank	I	ca. 1980–1985	4	Large Cylinder Tank
PIK-120-12	Fire Water Storage Tank 1	I	ca. 1980–1985	4	Large Cylinder Tank
PIK-121-12	Fire Water Storage Tank 2	I	ca. 1980–1985	4	Large Cylinder Tank
PIK-122-12	GCEP Switch House, Switchyard, Valve House and Oil Pumping Station	I	1982	4	Utility Yard
PIK-123-12	Waste Handling and Storage Facility (GCEP Feed and Withdrawal Facility)	I	ca. 1980–1985	4	Process Building
PIK-124-12	South Portal - Pedestrian	I	1985	4	Booth
PIK-125-12	South Portal - Vehicular	I	1985	4	Booth
PIK-126-12	Sewage Lift Stations	I and III	ca. 1970–1978	3	Mechanical Building
PIK-127-12	Mobile Equipment Garage	I	1979	4	Linear Garage
PIK-128-12	Warehouse K - Non-UEA	I	1953–1954, 1978	3	Warehouse
PIK-129-12	South Groundwater Treatment Facility	I	ca. 1994	3	Mechanical Building
PIK-130-12	Administration Portal - Vehicular	I	1983	4	Booth
PIK-131-12	GCEP Construction Warehouse	I	ca. 1980–1985	4	Warehouse
PIK-132-12	South pH Adjustment Facility	I	1979	3	Mechanical Building
PIK-133-12	South Environmental Sampling Building	I	1968	3	Mechanical Building
PIK-134-12	South Office Building	I	1977–1978	4	Office Building
PIK-135-12	South Weather Station	I	ca. 1979, ca. 1993–1996	3	Communications Antenna
PIK-136-12	East Environmental Monitoring Station (Liquid Effluent System)	II	1981	3	Mechanical Building
PIK-137-12	Recirculating Water Pump House	II	ca. 1993–1996	3	Weatherport
PIK-138-12	Little Beaver Groundwater Treatment Facility	II	ca. 1993–1996	3	Mechanical Building
PIK-139-12	Groundwater Treatment Facility	I	ca. 1995	3	Mechanical Building
PIK-140-12	Hazardous Waste Storage Building (GCEP Recycle/ Assembly Building and GCEP Training and Test Facility)	III	1983	4	Process Building
PIK-141-12	GCEP Waste Accountability Facility	III	1984	4	Warehouse
PIK-142-12	Undocumented temporary warehouse in X-7745 R Yard	III	ca. 1996–1997	3	Weatherport
PIK-143-12	Process Building, SNM Monitoring Portals	III	1956, 1981	2	Process Building
PIK-144-12	Instrumentation Tunnels (beside X-326, X-330 and X-333)	I and III	1954	2	Utility Tunnel
PIK-145-12	Process Building	III	1955	2	Process Building
PIK-146-9	Undocumented bridge over tributary to Little Beaver Creek	IV	ca. 1930–1950, ca. 1954	1	Bridge

Table C.4 (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-147-12	Switchyard, Test and Repair Building, Oil House, Valve Houses, GCEP Oil Pumping Station, undocumented building, undocumented mobile office	III	1954, 1980	2	Mechanical Building
PIK-148-12	Switch House (includes Control House, North Switch House, South Switch House)	III	1954	2	Utility Yard
PIK-149-12	Waste Oil Storage Building	III	1982	3	Weatherport
PIK-150-12	Personnel Monitoring Building	III	1955	2	Office Building
PIK-151-12	Recirculating Water Pump House	IV	ca. 1954–1955	2	Mechanical Building
PIK-152-12	Cooling Tower	IV	ca. 1954–1955	2	Heat Exchanging Structure
PIK-153-12	Cooling Tower	IV	ca. 1954–1955	2	Heat Exchanging Structure
PIK-154-12	Two undocumented booths in X-745 E Yard	IV	ca. 1970–1980	3	Booth
PIK-155-12	Undocumented shed in X-745 C Yard	III	ca. 1996–1997	3	Storage Shed
PIK-156-12	Toll Enrichment Facility	IV	1958, 1971–1975	2	Process Building
PIK-157-12	Feed Vaporization and Fluorine Generation Facility	IV	1954, 1982–1983	2	Process Building
PIK-158-12	Fluorine Storage Building	IV	1954	2	Mechanical Building
PIK-159-12	Maintenance Storage Building	IV	1958	2	Warehouse
PIK-160-12	Undocumented mobile office behind X-344 A	IV	ca. 1990–1997	3	Mobile Home
PIK-161-12	Hydrofluoric Acid Storage Building, Gas Ventilation Stack, Safety Building	IV	1958	2	Weatherport
PIK-162-12	Transformer Storage and Cleaning Building	IV	1985	3	Storage Garage
PIK-163-12	Pike Avenue Portal	IV	1976	3	Booth
PIK-164-12	Switchyard, Test and Repair Facility, Oil House, Valve Houses, Gas Reclaiming Cart Garage, Electric Power Tunnels and undocumented mobile office	IV	1954, 1955, 1985, ca. 1997	2	Utility Yard
PIK-165-12	Switch House (includes Control House, East Switch House, West Switch House)	IV	1955	2	Mechanical Building
PIK-166-12	Recirculating Water Pump House	II	1960	3	Mechanical Building
PIK-167-12	Process Building	IV	1955	2	Process Building
PIK-168-12	Construction Entrance Building, Truck Scale Facility	III	1975	3	Booth
PIK-169-12	Northeast Portal – Vehicular and Northeast Portal – Pedestrian	III	1985	4	Booth
PIK-170-12	Fire Training Building	III	ca. 1993	3	Emergency Training Building
PIK-171-12	Liquid Effluent Control Facility	III	1976	3	Mechanical Building
PIK-172-12	Sanitary Sewage Treatment Facility	III	ca. 1954–1955	2	Mechanical Building
PIK-173-12	Warehouses	III	1957, 1978	2	Warehouse
PIK-174-12	Sewage Treatment Facility	III	1980	4	Mechanical Building
PIK-175-12	Warehouses	III	1988	3	Warehouse

Table C.4 (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-176-12	West Environmental Sampling Building	III	1968	3	Mechanical Building
PIK-177-12	West Environmental Monitoring Station	III	1981	3	Mechanical Building
PIK-178-12	Ohio Valley Electric Corporation office building	III	ca. 1954, ca. 1980–1990	2	Office Building
PIK-179-12	Ohio Valley Electric Corporation storage shed	III	ca. 1960–1980	3	Tractor Shed
PIK-180-12	Ohio Valley Electric Corporation Microwave Tower and Dish	III	ca. 1980–1990	3	Communications Antenna
PIK-181-12	Don Marquis Substation (upper tier yard)	III	ca. 1954–1970	2	Utility Yard
PIK-182-12	Don Marquis Substation (lower tier yard)	III	ca. 1954–1970	2	Utility Yard
PIK-183-12	Warehouse	IV	1978	3	Warehouse
PIK-184-12	Salt Storage Building	IV	1979	3	Bin
PIK-185-12	Surplus and Salvage Warehouse	IV	1957, 1983	2	Warehouse
PIK-186-12	North Holding Pond Storage Building	IV	1981	3	Mechanical Building
PIK-187-12	North Environmental Storage Building	IV	ca. 1986	3	Booth
PIK-188-12	Booster Pump House and Appurtenances, Chlorinator Building, Diesel Generator Building	IV	1954	2	Mechanical Building
PIK-189-9	Landfill Utility Building	IV	1980	3	Storage Garage
PIK-190-12	Elevated Water Tank	III	ca. 1960	3	Elevated Cylinder Tank
PIK-191-12	Water Treatment Plant Chemical Building and Mixing and Settling Basins	IV	1954	2	Mechanical Building
PIK-192-12	Water Treatment Plant Filter Building, Chlorine Building and Recarbonation Building	IV	1954, 1979, ca. 1993–1997	2	Mechanical Building
PIK-193-12	Northeast Environmental Monitoring Station	IV	1981	3	Mechanical Building
PIK-194-12	Former Firing Range	IV	ca. 1960–1970	3	Weatherport
PIK-195-12	Undocumented pipeline from Water Treatment Plant to X-611 B Sludge Lagoon	IV	1979–1980	3	Pipeline
PIK-196-12	Undocumented sludge lagoon environmental monitoring station	IV	ca. 1980	3	Mechanical Building
PIK-197-9	Firing Range (New)	IV	ca. 1990	3	Open Firing Range
PIK-198-9	Undocumented water pipeline building near Little Beaver Creek	IV	ca. 1954	2	Mechanical Building
PIK-199-9	Undocumented railroad overpass over North Access Road	IV	1923, ca. 1952	1	Railroad Overpass
PIK-200-9	Undocumented barricade	IV	ca. 1980–1990	3	Earthen Barricade
PIK-201-9	Undocumented bridge over tributary to Little Beaver Creek	IV	ca. 1880–1920, ca. 1954	1	Bridge
PIK-202-12	Undocumented bridge over Little Beaver Creek	IV	ca. 1880–1920, ca. 1954	1	Bridge

Table C.4 (continued)

OHI No.	PORTS Name	Quadrant	Date	Period	Type
PIK-203-12	Northwest Portal – Vehicular and Northwest Portal – Pedestrian	III	1985	4	Booth
PIK-204-12	Undocumented temporary warehouse beside X-3346	I	ca. 1996–1997	3	Weatherport

Source: Dobson-Brown et al. 1996 and Coleman et al. 1997.
GCEP = Gas Centrifuge Enrichment Plant.
SNM = Special Nuclear Material.
UEA = Uranium Enrichment Administration.

APPENDIX D

PUBLIC COMMENTS RECEIVED ON DRAFT ENVIRONMENTAL ASSESSMENT

Responses to Comments from Maria Galanti, Site Coordinator, Division of Emergency and Remedial Response, Ohio Environmental Protection Agency, on the Environmental Assessment (EA) of the DOE's Quadrant II Corrective Measures Implementation Project

The following comments were received by DOE from Maria Galanti. These comments were greatly appreciated and warranted further consideration by DOE. Corrections have been made to the EA and additional information has been included. DOE's responses are shown in italics immediately following each comment.

Listed below are specific comments on the EA:

1. **"Section 2.1 Proposed Action, Page 2-1: The discussion of units deferred to decontamination and decommissioning (D&D) should be expanded. The decision to defer units to D&D was made in 1997 when the facility was still operating (i.e. enriching uranium). US DOE was responsible for operating the enrichment facilities. There was no discussion of 'cold stand by' nor was it a viable alternative to be considered. Therefore, it is Ohio EPA's opinion that those units deferred may need to be reconsidered for accelerated cleanup activities. Ohio EPA understands that for the purposes of this environmental assessment, US DOE is to discuss what has been presented in the Quadrant II CAS/CMS Report. Please note that Ohio EPA has yet to approve of the Quadrant II CAS/CMS Report. Ohio EPA did not agree to defer units due to 'cold stand by' operations but agreed to defer units as not to interfere with ongoing enrichment activities. Conditions at the facility have changed and therefore a re-examination of deferred units may be warranted. At this time it may be possible to further investigate units that have been deferred to determine the rate and extent of contamination as well as determine if there is an immediate threat to human health an/or the environment."**

   - *Although the status of the gaseous diffusion plant operation has changed from one of active enrichment to "cold stand by", the plant is being maintained in a manner which would allow return to operational status as quickly as possible should the energy requirements of the nation dictate the need for additional enriched uranium supplies. The conditions which necessitated deferral of some of the solid waste management units until D&D remain as long as a potential restart of uranium enrichment operations at PORTS if necessary is viable. When the deferred units are available for remediation, it is U.S. DOE's plan to conduct a separate NEPA review of that effort.*

2. **"Section 2.1.2 X-701B Groundwater Area-Range of Potential Corrective Measures, Page 2-10: The last sentence of the first paragraph of this page appears to have a typographical error. Please change the 100,00 :g/L to 100,000 ug/L or 1,000 mg/L."**

Ohio EPA

State of Ohio Environmental Protection Agency

Southeast District Office

2195 Front Street
Logan, OH 43138

TELE: (740) 385-8501 FAX: (740) 385-6490

Bob Taft, Governor
Christopher Jones, Director

November 26, 2002

**RE: US DOE-PORTS
PIKE COUNTY
OH ID# 466-0865**

DERR DOCUMENT REVIEW

Melda Rafferty
Project Manager
US Department of Energy
Portsmouth Site Office
P.O. Box 700
Piketon, Ohio 45661-0700

Dear Ms. Rafferty:

RE: DRAFT ENVIRONMENTAL ASSESSMENT QUADRANT II CORRECTIVE MEASURES IMPLEMENTATION

Enclosed are Ohio EPA's comments on the aforementioned report. According to the information presented, US DOE is proposing various alternatives to address the X-701B area contamination in soils and groundwater located in Quadrant II . US DOE will address other contaminated areas within Quadrant II in the future. Please review the enclosed comments and address as appropriate.

If you have any questions, please do not hesitate to contact me at (740) 380-5289.

Sincerely,

Maria Galanti
Site Coordinator
Division of Emergency and Remedial Response

MG/mg

cc: Melody Stewart, DHWM-SEDO
Graham Mitchell, Chief-OFFO
Gene Jablonowski, US EPA-Region V

Ohio EPA Comments

1) Section 2.1 Proposed Action, Page 2-1: The discussion of units deferred to decontamination and decommissioning (D&D) should be expanded. The decision to defer units to D&D was made in 1997 when the facility was still operating (i.e. enriching uranium). US DOE was responsible for operating the enrichment facilities. There was no discussion of "cold stand by" nor was it a viable alternative to be considered. Therefore, it is Ohio EPA's opinion that those units deferred may need to be reconsidered for accelerated cleanup activities. Ohio EPA understands that for the purposes of this environmental assessment, US DOE is to discuss what has been presented in the Quadrant II CAS/CMS Report. Please note that Ohio EPA has yet to approve of the Quadrant II CAS/CMS Report. Ohio EPA did not agree to defer units due to "cold stand by" operations but agreed to defer units as not to interfere with ongoing enrichment activities. Conditions at the facility have changed and therefore a re-examination of deferred units may be warranted. At this time it may be possible to further investigate units that have been deferred to determine the rate and extent of contamination as well as determine if there is an immediate threat to human health and/or the environment.

2) Section 2.1.2 X-701B Groundwater Area-Range of Potential Corrective Measures, Page 2-10: The last sentence of the first paragraph of this page appears to have a typographical error. Please change the 100,00 :g/L to 100,000 ug/L or 1,000 mg/L.

3) Section 2.1.2 X-701B Groundwater Area-Range of Potential Corrective Measures, Page 2-12: US DOE presented another potentially viable alternative for the X-701B Area, Electrical Resistence Heating (ERH). US DOE first presented this information to Ohio and US EPA in July 2002. US DOE does not discuss this alternative in the EA. US DOE notes in Section 1.1 of the EA that "If corrective measures are selected in Quadrant II that are outside of the scope of this bounding analysis, additional NEPA evaluation may be required." Ohio EPA believes that US DOE should consider ERH in this evaluation should this alternative be selected. As you are aware we have had several meetings discussing the potential benefits of such an alternative in the X-701B area for both soils and groundwater remediation. Rather than prepare an additional EA to discuss this one alternative, US DOE should modify this EA to include all pertinent information pertaining to ERH.

4) Section 3.2.2 Air Quality, Page 3-2: The document indicated that the majority of radiological emissions at PORTS resulted from the uranium enrichment process operated by USEC. While that may be true under current conditions, the document should be modified to indicate that in the historical air releases were US DOE 's responsibility.

5) Appendix E: US DOE has modified the alternatives and cost for several of the remedial actions presented in Appendix E. Please refer to comment #3 above. Please modify this section as appropriate to incorporate additional alternatives and or costs.

Ohio Historic Preservation Office

567 East Hudson Street
Columbus, Ohio 43211-1030
614/ 298-2000 Fax: 614/ 298-2037

Visit us at www.ohiohistory.org/resource/histores/

OHIO HISTORICAL SOCIETY
SINCE 1885

December 30, 2002

David R. Allen
DOE - Oak Ridge
P.O. Box 2001
Oak Ridge, TN 37831

Re: Construction of X-701B Holding Pond and Retention Basins
Portsmouth Gaseous Diffusion Plant, Pike County, Ohio

Dear Mr. Allen,

This is in response to correspondence from your office dated October 28, 2002 (received October 29) regarding the above referenced project. The correspondence transmits the Draft Environmental Assessment for Quadrant II Corrective Measures Implementation at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio. The comments of the Ohio Historic Preservation Office (OHPO) are submitted in accordance with provisions of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]); the Department of Energy serves as the lead federal agency.

The proposed actions include construction of three small basins as part of the 7 Unit groundwater treatment activities. Other actions are deferred. The basins are in an area that has been severely disturbed by previous activities. We agree that there will be no effect to the structures and the qualities that give significance to this historic property. We concur with your finding that there will be no historic properties affected by the proposed modifications to the groundwater treatment facility. We recommend that you maintain a file for this undertaking including mapping and photographs showing the setting before and after the construction. No further coordination with this office is necessary for this project unless there is a change in the scope of work.

Any questions concerning this matter should be addressed to David Snyder at (614) 298-2000, between the hours of 8 am. to 5 pm. Thank you for your cooperation.

Sincerely,

David Snyder

David Snyder, Archaeology Reviews Manager
Resource Protection and Review

DMS/ds

xc: Kristi Wiehle, U.S. Department of Energy – PORTS, Portsmouth Site Office, P.O. Box 700, Piketon, OH 45661

Response to Comments from David Snyder, Archaeology Reviews Manager, Resource Protection and Review, Ohio Historic Preservation Office (OHPO), on the Environmental Assessment (EA) of the DOE's Quadrant II Corrective Measures Implementation Project

A comment letter was received in response to DOE's request for public comments from David Snyder of the OHPO. The comments/recommendations in this letter were identical to comments/recommendations received on January 30, 2002, in response to a consultation letter regarding the EA from DOE. A copy of this letter is included in Appendix A of the EA. The EA was modified as result of this previous letter to incorporate the recommendations of the OHPO. These changes are reflected in Section 4.7 of the EA.

APPENDIX E

EXECUTIVE SUMMARY – QUADRANT II CAS/CMS

EXECUTIVE SUMMARY

This report presents the results of the Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) conducted for Quadrant II of the Portsmouth Gaseous Diffusion Plant (PORTS) located near Piketon, Ohio. PORTS currently enriches uranium for electrical power generation and until 1991 provided highly enriched uranium to the United States Navy. The U.S. government began production of enriched uranium at PORTS in the mid-1950s. The production facilities are owned by the U.S. Department of Energy (DOE) and have been leased to the United States Enrichment Corporation since July 1, 1993. Portions of the site are leased to the Ohio Army National Guard. The leased land use is industrial and will remain industrial for some time in the future. Industrial land use includes 1,000 acres of the federal reservation. Portions of PORTS outside of the security fence may be developed for commercial or recreational use in the future.

The environmental restoration program at PORTS is the subject of two enforcement actions. The State of Ohio issued a Consent Decree August 31, 1989, in accordance with the Resource Conservation and Recovery Act (RCRA) and its implementing regulations; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980; the National Contingency Plan (NCP); and applicable U.S. Environmental Protection Agency (U.S. EPA) policy. The U.S. EPA Region V issued an Administrative Consent Order (ACO) September 27, 1989, (amended May 11, 1994, and August 11, 1997) under the authority of Section 3008(h) of the RCRA of 1976. The Ohio Consent Decree requires a CAS and the U.S. EPA Administrative Order by Consent requires a CMS. The Ohio Environmental Protection Agency (Ohio EPA) and U.S. EPA have agreed to a single document, a CAS/CMS report, to fulfill the requirements for these essentially equivalent deliverables. A second amendment to the ACO executed August 11, 1997, relinquished day-to-day oversight of response action activities at PORTS to the Ohio EPA.

Because long-term surveillance, maintenance, and institutional controls will continue indefinitely, future uses of the site are limited and continuation of industrial activity is assumed. Continued industrial use of the PORTS facility is important for the Southern Ohio economy. Stakeholder discussions to date have resulted in the identification of preferred options to maintain industrial land use within the security fence and mixed industrial/commercial and potentially recreational land use in those areas of the federal reservation outside the security fence. Stakeholders have not recommended future residential land use development for PORTS.

The environmental restoration program included the formation of a Decision Team consisting of Ohio EPA, U.S. EPA, and DOE representatives to expedite decisions regarding technical and regulatory issues. Sitewide remediation strategies are influenced by Decision Team actions and supporting policy documents.

DOE evaluated the as low as reasonably achievable (ALARA) principles, considered current and future projected land use, reviewed best available technologies, and examined cleanup levels that have been established at other sites. Consideration of future land use and the ALARA process should be a pivotal part of the final selection of appropriate remedial alternatives for PORTS solid waste management units (SWMUs).

The PORTS Decision Team developed a system to categorize each SWMU on the basis of current and realistic future risk (excluding the future on-site resident exposure scenario) as determined by analyzing data from the RCRA Facility Investigation (RFI) Baseline Risk Assessment. Because both soil and groundwater in portions of Quadrant II are contaminated at levels exceeding acceptable risk, remedial action alternatives must be developed for the following SWMUs:

- X-701B Holding Pond and Retention Basins (Soils), and
- X-701B Groundwater Area.

The 7-Unit Groundwater Area contains contamination levels exceeding acceptable risk. However, the complete investigation of the 7-Unit plume cannot be completed at this time due to its location within the current industrial area. It is currently being contained and treated; therefore, there is no immediate threat to human health or the environment. The X-701C Neutralization Pit and soils in the area of the X-720 Neutralization Pit have been identified as potential source areas, and actions in these areas are outlined in this report. Source identification activities will continue through routine monitoring until additional investigation can be performed at Decontamination and Decommissioning (D&D).

A limited soil removal will be employed south of the former X-720 Neutralization Pit to eliminate inorganic contaminants exceeding soil PRGs. The excavation will then be backfilled and a concrete cover placed over the area.

A Director's Final Findings and Orders (DFF&Os) was journalized on March 18, 1999, to integrate several RCRA units into the CAS/CMS process. In Quadrant II, these units are the X-701C Neutralization Pit, the X-744Y Waste Storage Yard, the X-230J7 East Holding Pond and Oil Separation Basin, and the X-701B Holding Pond. As noted above, the X-701B Holding Pond soils and groundwater require development of remedial action alternatives. The X-701C Neutralization Pit will be removed.

At X-230J7, although the ELCR of 1×10^{-6} has been exceeded, remediation at this time would be neither more protective of human health and the environment nor economically responsible at this stage in the life cycle of the PORTS facility. Therefore, remediation of soils and sediment at this unit will be deferred to PORTS D&D. Groundwater data for X-230J7 has been evaluated as part of the X-701B Groundwater Area.

The substantive requirements of RCRA have been met for soils at the X-744Y Waste Storage Yard, and the groundwater plume at the X-744Y Waste Storage Yard will be addressed as part of the X-701B plume in Chapter 7. The selected actions taken at all of these RCRA units will be implemented in accordance with the CMI Work Plan. Closure certification will be met when the CMI Final Report is submitted to the Ohio EPA. The post-closure requirements of RCRA will be contained in the Operation & Maintenance (O&M) Plan. Certification of completion of post-closure care will be met upon submittal of the O&M Monitoring Final Report.

The PORTS Quadrant II CAS/CMS process leads to the development of remedial alternatives. Evaluation and selection of appropriate remedial alternatives require establishment of remedial action objectives (RAOs). These RAOs are qualitative statements, not numerical cleanup targets, that provide the basis for both generating and evaluating remedial alternatives. Preliminary remediation goals (PRGs) were developed to assess the effectiveness of remedial actions used to meet RAOs. The PRGs were developed by using background values, regulatory criteria, and risk data.

A presumptive response strategy, developed by the U.S. EPA, defines response actions and remedies for sites with contaminated groundwater and presumptive technologies for ex situ treatment of contaminated groundwater. The contaminants and site conditions at PORTS are appropriate for the application of presumptive remedies suggested by the U.S. EPA. As recommended in the presumptive strategy guidance, this CAS/CMS streamlines the technology identification and screening steps and focuses on the evaluation of the presumptive remedy technologies.

Innovative treatment technologies for use in remediation of soil and groundwater and containment of groundwater plumes have been evaluated at PORTS and have been incorporated into remedial alternatives when their effectiveness has been demonstrated. New and innovative technologies will continue to be evaluated as appropriate applications are identified.

X-701B HOLDING POND AND RETENTION BASINS (SOILS)

The X-701B Holding Pond was an unlined 200 ft by 50 ft pond used for the neutralization and settling of metal-bearing and acidic wastewater. The X-701B Holding Pond was in use from 1954 until November 1988 and was regulated as an NPDES outfall between August 1983 and September 1991. Most of the waste discharged to the pond originated at the X-700 Chemical Cleaning Facility and the X-705 Decontamination Building. From 1974 until 1988, slaked lime was added to the X-701B influent at the X-701E Neutralization Facility to neutralize the low pH and induce precipitation. This precipitation caused large amounts of sludge to accumulate in the pond and necessitated periodic dredging of the sludge. The sludge recovered during dredging was stored in two retention basins located to the northwest of the pond.

The X-701B East and West Retention Basins were unlined sludge retention basins used for the settling, dewatering and storage of sludge removed from the X-701B Holding Pond. The East Retention Basin, built in 1973, was approximately 220 ft by 65 ft (narrowing to 25 ft wide in the northeast corner) and was 3.5 ft deep. The east basin was in use from 1973 until approximately 1980. The West Retention Basin was built in 1980, when the east basin reached capacity. The west basin was approximately 220 ft by 45 ft (narrowing to 35 ft wide in the northern portion) and was 3 ft deep. The west basin was in use from 1980 until 1988.

In 1989, PORTS initiated a two-phase closure of the unit. As part of the first phase, sludge was excavated from the holding pond and two retention basins. The sludge was dewatered, placed in containers, and transported to on-site storage. The retention basins were backfilled, graded and seeded. The second phase began in 1994, and included construction of a groundwater pump-and-treat system and in-situ treatment of soils in the bottom of the holding pond with thermally enhanced vapor extraction (TEVE). Limestone riprap and gravel were placed on the bottom of the holding pond to support the soil treatment equipment. Use of TEVE was terminated after it failed to achieve identified performance standards. However, the limestone riprap and gravel material currently remains in the holding pond, and a gravel access road remains on the southeast side of the holding pond. Two pumps in a sump located in the low point of the holding pond remain operational. The water removed by these two pumps is transferred, via underground piping, directly into the X-623 Groundwater Treatment Facility.

During 1997 and 1998, an investigation in the X-701B Retention Basin area revealed that the saturated fill material in the retention basins was contaminated with uranium and technetium at concentrations that exceed PRGs. In addition, detectable concentrations of transuranics were discovered. The higher radionuclide concentrations found in the fill material are believed to be the result of incomplete removal of sludge during initial closure actions at the retention basins. Existing data does not indicate that radioactive contaminants are migrating from the retention basins to either surface water or groundwater at concentrations exceeding PRGs.

The X-701B Holding Pond and Retention Basins were integrated into the CAS/CMS process in the DFF&Os journalized on March 18, 1999.

A range of potentially viable remedial alternatives has been assembled for the X-701B Holding Pond and Retention Basins by using representative process options. All alternatives were selected for their potential to meet RAOs, address all environmental problems, reduce overall risk, and protect human health and the environment. An alternative has been assembled for each of the following categories: institutional controls, removal, and capping. The remedial alternatives for soils at the X-701B Holding Pond and Retention Basins are as follows:

- Alternative 1 - Institutional Controls

  Deed restrictions to limit land development and access controls to prevent exposure to contaminated soils are included in this alternative.

- Alternative 2 - Institutional Controls and Removal

  Future land use at the area associated with the X-701B Holding Pond and Retention Basins would be limited to commercial/industrial activities through deed restrictions that would prevent development of the excavated area. Contaminated soil would be removed to the base of the retention basins and to depths where contaminants exceed their PRG. The horizontal extent of contamination would be addressed by excavating 2 ft beyond the edges of the retention basins and 10 ft from data points in the holding pond where contaminants exceed PRGs. Excavated soil would be evaluated to determine the proper disposal method, but is assumed to be a mixed waste in this report.

- Alternative 3 - Institutional Controls, Select Removal and Capping

  Select solids excavation and backfilling in conjunction with capping is highly effective and implementable. This alternative includes installation of a multimedia cap system over the X-701B Holding Pond and Retention Basins. There would be selected excavation of soil in outlying areas where there have been sporadic detections of contaminants. Institutional controls include deed and access restrictions.

Table ES.1 summarizes the relative effectiveness and costs for the X-701B Holding Pond and Retention Basins alternatives evaluated.

Alternative 1 will not meet all RAOs because contaminant concentrations will not be reduced below established leaching levels. Alternatives 2 and 3 minimize both long-term and short-term risks to human health and the environment and will meet RAOs by eliminating the exposure pathway and reducing contaminant concentrations. All of these alternatives can be readily implemented and have been proven reliable and effective.

X-701B GROUNDWATER AREA

This area of groundwater contamination extends east from the vicinity of the former X-701B Holding Pond to the vicinity of Little Beaver Creek. The plume width does not exceed 300 ft. TCE concentrations in the most contaminated portions of this plume exceed 100,000 ug/L.

A comprehensive series of model simulations incorporating various remedial technologies, both alone and in combination, have been evaluated. These model simulations indicate that it is not practicable to move a sufficient quantity of water through the Gallia saturated zone to remediate groundwater and associated saturated soils to concentrations less than PRGs in all areas of the plumes within the targeted 30-year timeframe. Even with extensive application of best available technologies, the hydrogeologic conditions in this area preclude achieving the target risk level of 1×10^{-6} within 30 years. However, these simulations do indicate that groundwater contaminant levels can be reduced to an acceptable risk level of 1×10^{-5} in a much shorter timeframe, in effect attaining the concentrations which are as low as reasonably achievable given the constraints of the local hydrogeologic system.

The alternatives selected employ the best available technologies for this area of the PORTS site. Alternatives were selected for their potential to meet RAOs, address all environmental problems, reduce overall risk to acceptable levels, and protect human health and the environment. The no action alternative provides a baseline for comparison with active remedial measures. All alternatives, except for Alternative 1, include monitoring the effects of the remedial action chosen. The following are the remedial alternatives for the X-701B Groundwater Area.

Table ES.1. Summary of Alternative Analysis for X-701B Holding Pond and Retention Basins (Soils), Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Alternative	Technical Analysis	Human Health Analysis	Environmental Analysis	Institutional Analysis	Capital Cost Analysis (Present Worth - $1,000s)	O&M Cost (Present Worth - $1,000s)
1 – Institutional Controls	Readily implementable. Deed restrictions and existing fencing would be reliable if site controls are maintained.	No short-term risk. Long-term exposure to on-site workers.	No risk to environmental indicators.	Does not meet all RAOs and preliminary ARARs.	68	103
2 – Institutional Controls and Removal	Readily implementable. Removal of construction debris and associated soil followed by backfilling of the area.	Short-term risk to remediation workers. Long-term risk eliminated through elimination of the pathway.	No risk to environmental indicators. Could initially disrupt ecological receptors but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	4,012	103
3 – Institutional Controls, Select Removal and Capping	Readily implementable. Removal of select soil followed by capping the retention basin and holding pond areas.	Short-term risk to remediation workers. Long-term risk eliminated through elimination of the pathway.	No risk to environmental indicators. Could initially disrupt ecological receptors but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	1,820	103

The remedial alternatives for groundwater at the X-701B Groundwater Area include the following:

- Alternative 1 - No Action

  No actions are assumed for this alternative. No access and use restrictions, maintenance or monitoring is included.

- Alternative 2 - No Further Corrective Action

  This alternative includes groundwater/surface-water monitoring activities and basement sumps in the X-705 Decontamination Building that continue to operate. The X-701B IRM trench and the X-701B extraction system would also continue to operate.

- Alternative 3 - Oxidant Injection, Vacuum Enhanced Recovery (VER) and Phytoremediation

  This alternative includes an area of oxidant injection, an area of VER recovery wells, and an area of cultivation of poplar trees. Basement sumps in the X-705 Decontamination Building and the X-701B IRM trench would continue to extract contaminated groundwater for the entire 30-year model simulation.

- This alternative includes installation of an extraction/reinjection well network with treatment of extracted groundwater at the existing X-623 and X-624 facilities. Basement sumps in the X-705 building and the X-701B IRM trench would continue to extract contaminated groundwater for the entire 30-year model simulation.

- Alternative 4 - VER and Steam Stripping

  This alternative includes 24 VER wells with associated equipment that would operate for two years. Steam Stripping, which consists of a combination of steam injection and groundwater extraction wells, would be used to remove the volatile contaminants in the western portion of the X-701B Groundwater Area plume and would operate for two years. Basement sumps in the X-705 Decontamination Building and the X-701B IRM trench would continue to extract contaminated groundwater for the entire 30-year model simulation.

- Alternative 5 - VER

  Thirty-nine VER wells would be installed throughout the X-701B Groundwater Area plume. These wells would operate for two years at which time 25 of the wells continue operation for the remainder of the simulation. Basement sumps in the X-705 Decontamination Building and the X-701B IRM trench would continue to extract contaminated groundwater for the entire 30-year model simulation.

- Alternative 6 - Groundwater Extraction and Bioremediation

  Enhanced Bioremediation of the eastern portion of the X-701B Groundwater Area plume would be accomplished in the first two years of this simulation. Nine groundwater extraction wells located in the remaining areas of the plume would operate for the entire 30-year simulation. Basement sumps in the X-705 Decontamination Building and the X-701B IRM trench would continue to extract contaminated groundwater for the entire 30-year model simulation.

- Alternative 7 - Oxidant Recirculation

  Thirty extraction wells and 17 injection wells would be installed throughout most of the X-701B Groundwater Area plume. Contamination reduction would be achieved in the first six months of this simulation. Reduction would be accomplished by extracting groundwater, circulating it through the above ground oxidant injection system, and reinjecting the treated groundwater into the injection wells where the oxidant would reduce residual soil contamination as well as groundwater contamination. Basement sumps in the X-705 Decontamination Building and the X-701B IRM trench would continue to extract contaminated groundwater for the entire 30-year model simulation.

Table ES.2 summarizes the relative effectiveness and costs for the X-701B Groundwater Area alternatives.

Alternatives 3, 5, 6, and 7 meet all RAOs and would significantly reduce the overall mass of contaminants in the groundwater. Alternative 4 would meet all RAOs with the exception that COCs may impact surface water at X-230J7. Alternatives 3 through 7 would minimize both short-term and long-term risks to human receptors. Alternative 7 may pose additional short-term risks to ecological receptors in the area because oxidizing agents will be injected in areas that are adjacent to surface water bodies and could potentially migrate to surface water. All of the alternatives are readily implementable.

Table ES.2. Summary of Alternative Analysis for the X-701B Groundwater Area Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Alternative	Technical Analysis	Human Health Analysis	Environmental Analysis	Institutional Analysis	Estimated Maximum TCE Concentration at 30 years ($\mu g/L$)	Estimated Maximum ELCR at 30 years	Estimated Remaining Plume Area Above PRGs (ft^2)	30 Year Present Worth Costs ($1,000s) Capital/ O&M
1 - No Action	Readily implementable. Not effective at reducing exposure to contaminants.	No short-term risk. Long-term exposure to on-site workers and off-site population.	No risk to environmental indicators.	Does not meet all RAOs and preliminary ARARs.	6,830	1.31×10^{-3}	2,800,000	0/0
2 - No Further Corrective Action	Readily implementable. Dependent on continued DOE ownership of property.	Short-term risk to remediation workers. Long-term risk reduced by continued operation of existing treatment facilities.	No risk to environmental indicators.	Does not meet all RAOs and preliminary ARARs.	1,490	2.87×10^{-4}	690,000	0/10,971
3 - Oxidant Injection, VER, and Phytoremediation	Readily implementable. Proven and reliable technology.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental indicators.	Can meet all RAOs and preliminary ARARs.	120	6.35×10^{-6}	326,000	9,167/7,218
4 - VER and Steam Stripping	Readily implementable. Processes have been demonstrated to be reliable.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental indicators.	Can meet all RAOs and preliminary ARARs with the exception that COCs may impact surface water.	14.4	2.77×10^{-6}	200,000	10,516/16,003
5 - VER	Readily implementable. Process had been demonstrated to be reliable.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental indicators.	Can meet all RAOs and preliminary ARARs.	25.9	4.98×10^{-6}	180,000	2,348/17,665
6 - Groundwater Extraction and Bioremediation	Readily implementable. Process had been demonstrated to be reliable.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental indicators.	Can meet all RAOs and preliminary ARARs.	22.5	4.33×10^{-6}	263,000	2,781/15,503
7 - Oxidant Recirculation	Readily implementable. Use of proven and reliable technology coupled with demonstrated in situ method.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	Potential for oxidant migration to surface water initially disrupting ecological receptors but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	25.8	5.16×10^{-6}	120,000	1,560/17,315

DOE/OR/12-1223&D5/A1

Addendum to

Quadrant II
Cleanup Alternatives Study/Corrective Measures Study

for

Portsmouth Gaseous Diffusion Plant
Piketon, Ohio

Date Issued —November 2001

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BECHTEL JACOBS COMPANY LLC
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Environmental Management Activities at the
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Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant
under contract DE-AC05-98OR22700
for the
U.S. DEPARTMENT OF ENERGY

EXECUTIVE SUMMARY

Upon review of the Quadrant II Cleanup Alternatives Study/Corrective Measures Study (CAS/CMS) Final Report (DOE 2001), Ohio Environmental Protection Agency (EPA) suggested that several additional alternatives for the remediation of the X-701B Holding Pond and Retention Basin soils be considered prior to selection and implementation. This addendum describes the development and analysis of four additional remedial alternatives, as identified by Ohio EPA in a letter dated August 31, 2001, for the soils associated with the X-701B Holding Pond and Retention Basins. These additional alternatives are variations of the three originally proposed alternatives. In addition, the cost estimate for Alternative 1 has been recalculated with updated information and presented as Alternative 4 for comparison with the new alternatives.

The additional remedial alternatives for soils at the X-701B Holding Pond and Retention Basins are as follows:

- Alternative 4 - Institutional Controls

  This alternative is identical to the original Alternative 1, only with associated costs updated. It includes deed restrictions to limit land development and access controls to prevent exposure to contaminated soils.

- Alternative 5 - Institutional Controls and Removal

  The pond and retention basins will be excavated to the water table (maximum 15 ft depth) to remove contaminants exceeding preliminary remedial goals (PRGs). The horizontal limits of excavation will extend 2 ft beyond the edges of the retention basins and 10 ft radially from sampling locations, including outlying sample locations, where contaminants exceed PRGs in soil. The excavated area will be partially backfilled, as needed, and graded to drain into the existing drainage ditch north of the holding pond. The soil excavated will be containerized and shipped off-site for disposal as low-level radioactive waste (LLW). Soil from beneath the X-701B Holding Pond will be segregated and shipped off-site as mixed (hazardous and LLW) waste. An existing storm sewer will be modified to drain into the excavation area and the drainage ditch. The existing monitoring, injection, and extraction wells and X-701E Neutralization Building will be relocated. Institutional controls include deed and access restrictions.

- Alternative 6 - Institutional Controls, Select Removal, and Capping

  An engineered cap meeting Resource Conservation and Recovery Act (RCRA) Subtitles C and D and Ohio Hazardous Waste and Solid Waste requirements will be placed over the pond and basins. The cap will extend 25 ft beyond the limits of the pond and basins. Outside of the capped area, soils that have contamination exceeding PRGs will be excavated (maximum excavation depth of 15 ft) and placed under the cap. The existing drain piping located in the holding pond will be abandoned in place and the drain pumps removed. The existing monitoring, injection, and extraction wells and X-701E Neutralization Building will be relocated. The existing storm sewer will be re-routed to the north of the capped area. Institutional controls include deed and access restrictions.

- Alternative 7 - Institutional Controls and On-Site Disposal

  Excavate the holding pond and retention basins to a maximum depth of 15 ft and horizontal limits of excavation extending 2 ft beyond the holding pond and retention basins. In addition, excavate surrounding areas that have been identified as exceeding the established PRGs to a maximum depth of 15 ft. The excavation resulting from the removal of the holding pond and the East Retention Basin will be converted to an engineered disposal cell, with a leachate collection system, a liner system, and an engineered cap sized to encompass the entire excavated area. The disposal cell will have the capacity to accept all the excavated materials from the X-701B Holding Pond and Retention Basin area. The existing monitoring, injection, and extraction wells and X-701E Neutralization Building will be relocated. Institutional controls include deed and access restrictions.

- Alternative 8 - Institutional Controls, Select Removal, and Capping with Piping System

  This alternative is the same as Alternative 6 above, with the exception that the existing drain pumps located in the holding pond will remain in place and additional piping will be installed for use with the existing piping system in a possible future remediation system, such as oxidant injection.

Table ES.1 summarizes the relative effectiveness and costs for the additional alternatives evaluated for soils at the X-701B Holding Pond and Retention Basins.

Alternative 4 will not meet all Remedial Action Objectives (RAOs) because contaminant concentrations will not be reduced below established leaching levels. Alternatives 5, 6, 7, and 8 minimize both long-term and short-term risks to human health and the environment and will meet RAOs by eliminating the exposure pathway and reducing contaminant concentrations. All of these alternatives can be readily implemented and have been proven reliable and effective.

Table ES.1. Summary of Alternative Analysis for X-701B Holding Pond and Retention Basins soils

Alternative	Technical Analysis	Human Health Analysis	Environmental Analysis	Institutional Analysis	Capital Cost Analysis (Present Worth - $1,000s)	O&M Cost (Present Worth - $1,000s)
4 – Institutional Controls	Readily implementable. Deed restrictions and existing fencing would be reliable if site controls are maintained.	No short-term risk. Long-term exposure to on-site workers.	No risk to environmental indicators.	Does not meet all RAOs and preliminary ARARs.	229	98
5 – Institutional Controls and Removal	Implementable with consideration needed for wind-blown radioactive dust. Removal of construction debris and associated soil.	Short-term risk to remediation workers, including significant health physics concerns caused by wind-blown radioactive dust. Long-term risk eliminated through elimination of the pathway.	No risk to environmental indicators. Could initially disrupt ecological receptors, but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	28,267	98
6 – Institutional Controls, Select Removal, and Capping	Readily implementable. Relocation of select soil followed by capping the retention basin and holding pond areas.	Short-term risk to remediation workers. Long-term risk eliminated through elimination of the pathway.	No risk to environmental indicators. Could initially disrupt ecological receptors, but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	4,343	98
7 – Institutional Controls and On-site Disposal	Implementable with consideration needed for wind-blown radioactive dust. Disposal of contaminated soil in a lined disposal cell.	Short-term risk to remediation workers, including significant health physics concerns caused by wind-blown radioactive dust. Long-term risk eliminated through elimination of the pathway.	No risk to environmental indicators. Could initially disrupt ecological receptors, but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	9,581	98
8 – Institutional Controls, Select Removal, and Capping with Piping System	Readily implementable. Relocation of select soil followed by capping the retention basin and holding pond areas.	Short-term risk to remediation workers. Long-term risk eliminated through elimination of the pathway.	No risk to environmental indicators. Could initially disrupt ecological receptors, but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	4,391	98

ARARs = Applicable or Relevant and Appropriate Requirements

O&M = operation and maintenance

Attachment 2
Quadrant II CAS/CMS Alternative 8 (Oxidant Injection) For The X-701B Groundwater Area

QUADRANT II
CLEANUP ALTERNATIVES STUDY/CORRECTIVE MEASURES STUDY (CAS/CMS)
ALTERNATIVE 8 (OXIDANT INJECTION)
FOR THE X-701B GROUNDWATER AREA

1. INTRODUCTION

This document outlines an additional remedial alternative for groundwater to supplement the Quadrant II Cleanup Alternatives Study (CAS)/Corrective Measures Study (CMS) Final Report (dated February 28, 2001) and Addendum (dated November 2001) for the Portsmouth Gaseous Diffusion Plant (PORTS) Piketon, Ohio. Under this remedial alternative, called Alternative 8, corrective actions will be performed to remediate the X-701B Groundwater Area, as shown in Figure 1. An evaluation of the effectiveness of these groundwater remedies will be conducted during the phased implementation and as part of the five-year review process using the U.S. Environmental Protection Agency (EPA) Comprehensive Five-Year Review Guidance, EPA 540-R01-007/OSWER No. 9355.7-03B-P, June 2001. Concurrent with development of remedial alternatives, an environmental assessment addressing corrective measures alternatives at Quadrant II is being conducted to satisfy National Environmental Policy Act (NEPA) requirements.

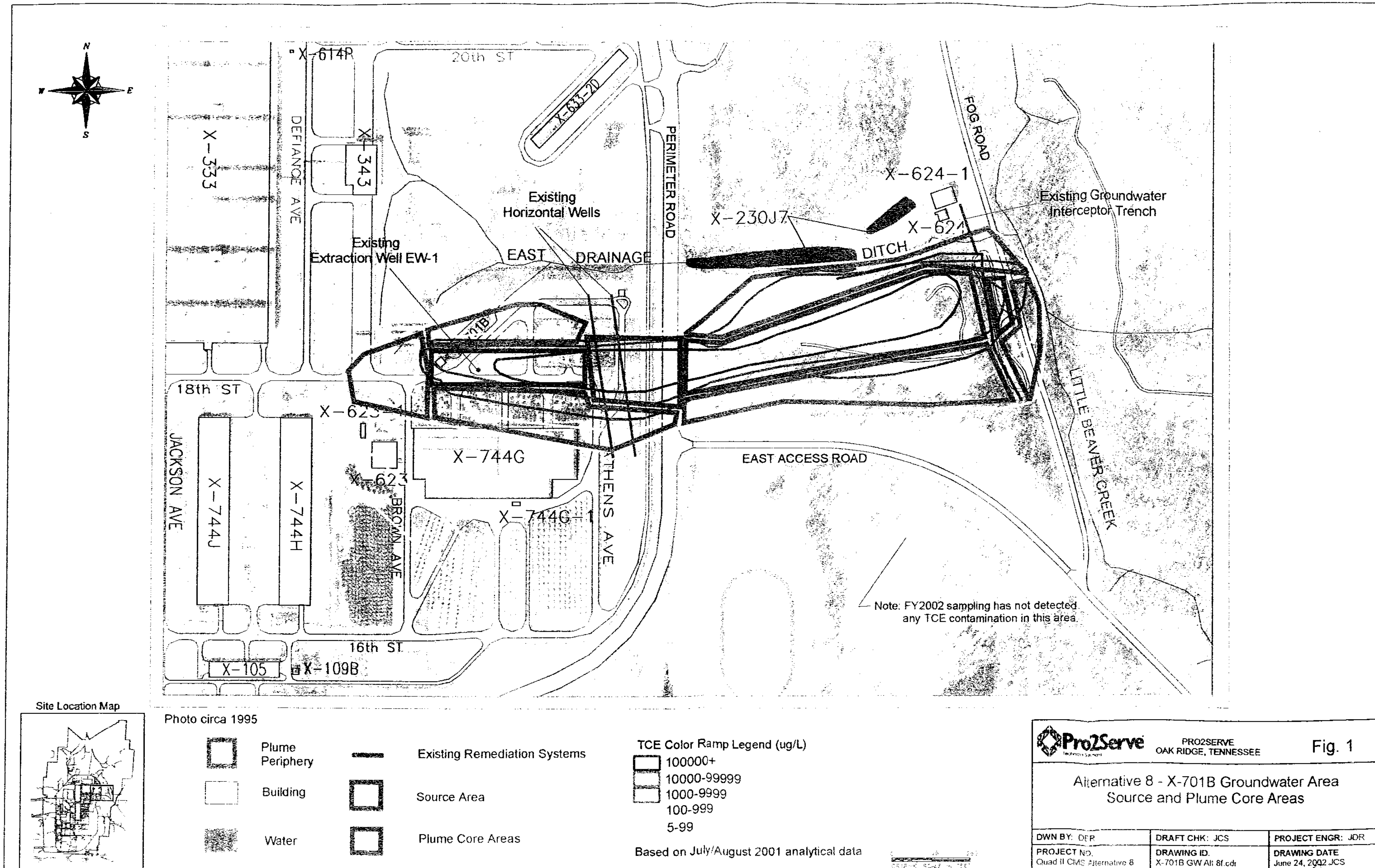
Alternative 8 is presented to accelerate groundwater remediation through in situ destruction of contaminant mass in both the source area and plume core. Alternative 8 is similar to Alternative 7 in the CAS/CMS report, except that oxidant recirculation has been replaced with:

- Oxidant injection,
- Followed by Electric Resistance Heating (ERH) in areas where residual contamination sources remain in low permeability soils, and
- The area of application for the remedy at the X-701B Groundwater Area has been expanded.

This alternative includes aggressive actions in the vicinity of the groundwater area also identified as requiring a corrective action for soils (see Chapter 6 of the Quadrant II CAS/CMS Final Report and the Addendum). The U.S. Department of Energy (DOE) requests that a decision on the particular corrective action for soils, (e.g., an engineered cap) be delayed until evaluation of the performance of the groundwater actions is completed. Evaluation of groundwater quality in the vicinity of the X-701B Holding Pond and Retention Basins will be performed as part of a five-year review.

Alternative 8 includes implementation of an aggressive remedial technology in the X-701B Groundwater Area for source control and plume reduction as follows:

- To address the majority of contamination in groundwater:
  - An oxidant solution will be injected in suspected source areas of the western portion of the groundwater plume (west of Perimeter Road),
  - An oxidant solution will be injected along the plume core (east of Perimeter Road), and
  - An oxidant solution will be injected in the plume periphery.
- Following completion and evaluation of oxidant injection, to address residual contamination sources remaining in low permeability soils:
  - ERH will be utilized to address residual contamination sources in low permeability soils, as required.
- Existing groundwater extraction well EW-1 will be placed in service and operated as needed, and
- The Interim Remedial Measure (IRM) trench is expected to continue operation until Remedial Action Objective (RAOs) are met.



Pro2Serve PRO2SERVE OAK RIDGE, TENNESSEE

Fig. 1

Alternative 8 - X-701B Groundwater Area Source and Plume Core Areas

DWN BY: DFP	DRAFT CHK: JCS	PROJECT ENGR: JDR
PROJECT No. Quad II CMS Alternative 8	DRAWING ID. X-701B GW Alt 8f.cdr	DRAWING DATE June 24, 2002 JCS

Long-term institutional controls via land use restrictions will be developed and implemented to prevent exposures to groundwater if any residual contamination remains after remedial activities are completed.

Soil sampling and groundwater monitoring will be used to evaluate and optimize the performance of the oxidant injection. If monitoring results show that oxidant injection is not effective in meeting RAOs, then ERH in conjunction with soil vapor extraction will be initiated. This heating technique is being demonstrated this year at the Paducah Gaseous Diffusion Plant. If prior to installation of ERH, other technologies (such as Vacuum Enhanced Recovery (VER) or an enhanced oxidant delivery system) are determined to be appropriate, these technologies will be implemented to achieve RAOs (see Figure 2).

Estimates of contaminant mass removal and evaluation of contaminant concentration trends will provide key performance metrics for the remedy. Groundwater monitoring will continue after treatment activities are completed to assess the effectiveness of the remedy in meeting the RAOs.

All groundwater remediation activities entail varying levels of uncertainty regarding effectiveness and the timeframe for cleanup. Alternative 8 is expected to be an effective method for addressing the residual Dense Non-Aqueous Phase Liquids (DNAPL) high concentration plume core. As stated above, performance-monitoring data will be used to assess its effectiveness in meeting the RAOs. In the event that the in situ chemical oxidation technology is unable to meet the performance goals necessary to attain the RAOs, the secondary remedy, ERH will be implemented. Design efforts will include the development of a performance-monitoring plan. A key objective of this plan will be to identify the specific criteria (e.g., percent removal or time-averaged concentration trends) needed to assess the effectiveness of the technology, which in turn would support a decision regarding the need for a contingent remedy.

2. TECHNICAL ANALYSIS

This technical analysis is presented to provide basic design information that will facilitate alternative evaluation. A summary of the alternative follows:

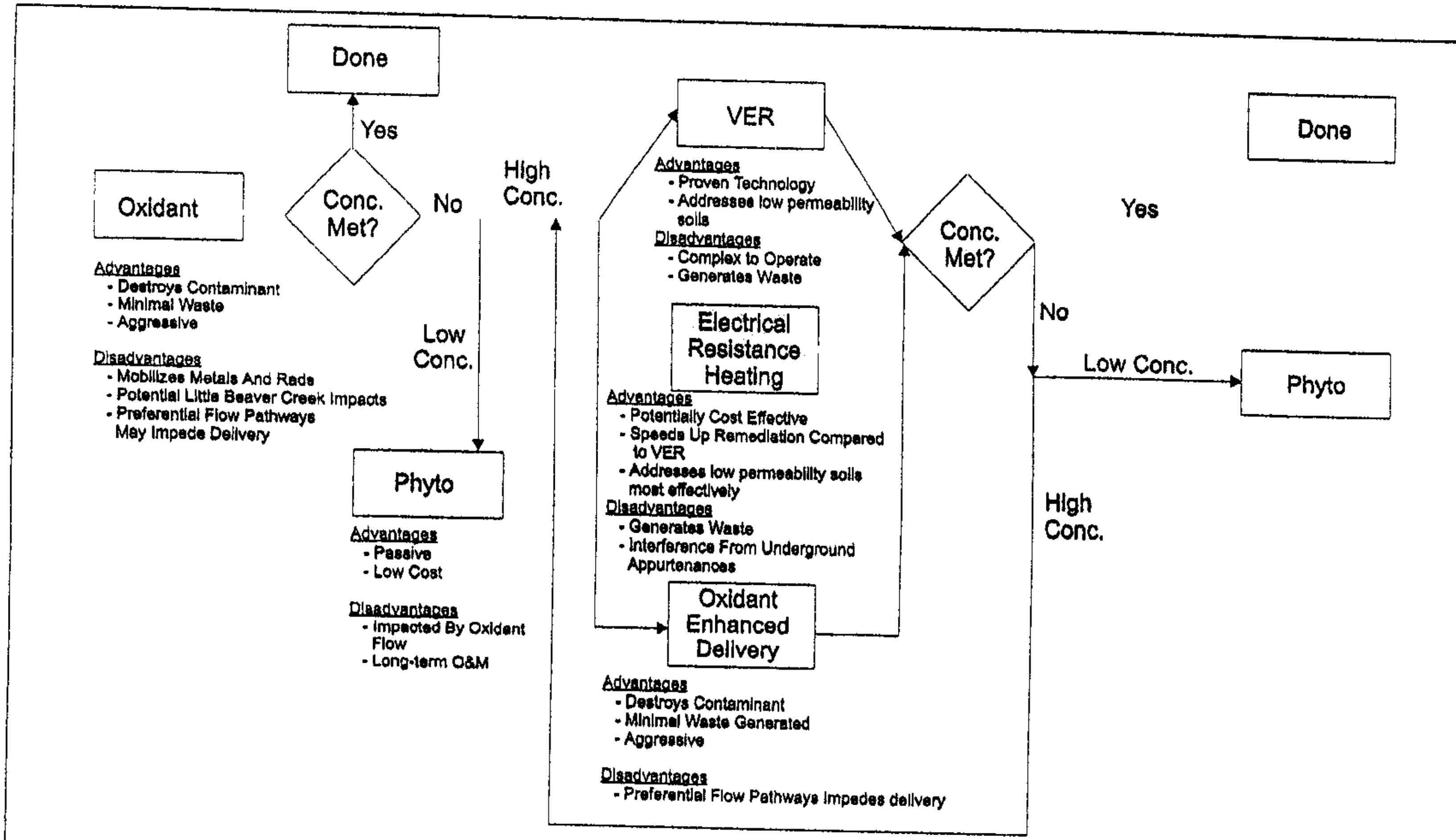
(1) The oxidant injection system will be implemented through a phased construction approach. Oxidant injection system is expected to operate for an estimated 2-year period (the system is not expected to operate during freezing conditions). The oxidant injection system includes:

- Oxidant injection over an approximate 1-acre area extending from the western end of the highest concentration portion of the plume to the east end of 18th Street. This treatment area includes the suspected source area. The area includes the southwest portion of the former X-701B Holding Pond, the area where the oxidant treatability test was installed in late 2001, and an area beneath the southwest corner of the X-747G Precious Metals Storage Yard.

- Planned injection of oxidant into the two existing horizontal wells just west of Perimeter Road.

- Planned oxidant injection over an approximately 4.5-acre area coinciding with the plume core between Perimeter Road and the IRM trench.

- Injection of oxidant is also planned to be performed in the plume periphery via existing monitoring wells and several new wells whose location and number is to be determined in the system design. Oxidant will be injected into wells completed in the Gallia sand and gravel.



Proposed Alternative Oxidant Injection Followed by Electrical Resistance Heating, If needed, as a Preferential Path Forward for Remediation of Residual Concentration.

Fig. 2	Oxidant Injection and Contingent Remediation Activities Decision Tree	DOCUMENT ID:	DRAWING ID: Decision Tree.sdr	DRAWING DATE: June 24, 2002 SLC

(2) The ERH system will be:

- Implemented in low permeability source areas following completion and evaluation of oxidant injection.
- Implemented in areas if rebound of contaminant concentrations occurs following oxidant injection and evaluation.

(3) The groundwater extraction system is expected to include:

- One existing extraction well (EW-1) extending 32 ft. below ground surface in the vicinity of the former X-701B Holding Pond, operating as needed to extract DNAPL.
- Extracted groundwater will be treated in the existing X-623 Groundwater Treatment Facility. If dense non-aqueous phase liquids (DNAPLs) are recovered, they will be removed at the X-701E building DNAPL separator.

(4) Monitoring will be conducted at selected existing wells. Additional monitoring wells may need to be installed to support remedial evaluation. Soil sampling (pre- and post-treatment) will be used to support mass removal calculations.

(5) The X-701B IRM trench will continue during the 2-year period of oxidant treatment. Continued operation of the IRM trench will depend on the post-treatment groundwater concentrations and whether operation is needed to meet the remedial action objectives.

(6) The X-701B sump used to drain surface runoff/precipitation will continue to operate until the soils remedy for the holding pond and adjacent areas is implemented.

(7) The X-700 Chemical Cleaning Building and X-705 Decontamination Building sumps will continue to operate. Operation of the sump pumps minimizes the interaction between the 7-Unit plume and the X-701B plume and is part of the design basis for the remediation of the X-701B plume.

(8) Institutional controls are expected to be consistent with the current DOE site land use and will consist of continued DOE access restrictions. For the purposes of this alternative analysis, it was assumed that the X-701B site will remain under government control and that long-term land use will be restricted industrial.

2.1 Performance

Under this alternative, contaminant mass will be destroyed and transformed into innocuous substances such as carbon dioxide, water and inorganic chloride. The magnitude of groundwater contamination and total volume of contaminated groundwater will be reduced as mass is destroyed through in situ treatment and remaining residual dissolved-phase contamination is attenuated through natural processes (such as diffusion and dispersion). Oxidant injection is considered an emerging technology; however, there have been several field pilot tests of the technology at PORTS that have established its applicability to the site. The addition of ERH will enhance the removal of residual source material to facilitate the achievement of RAOs.

RAOs are expected to be met in the source and plume core areas within five years of completion of injection and ERH in the plume core. Oxidant injection in the plume periphery will be conducted using multiple portable injection equipment; injection wells will be spaced such that RAOs are expected to be met in the order of 10 to 30 years. The oxidant and the injection technologies employed will be determined during the system design. The design of the injection system will be based on the objectives of eliminating residual DNAPL in the source area and attaining RAOs as quickly as possible, while remaining cost-effective. Modeling and/or calculations will be completed to generate an estimate of the cleanup timeframe, which would be updated as the remediation progresses and performance data are collected. The chemical oxidation of trichloroethene (TCE) will be quite rapid once the oxidant contacts the contaminant. The overall timeframe for cleanup will depend on the injection spacing and the extent to which oxidant transport is limited by advective groundwater velocities or diffusion. In order to accomplish the cleanup as quickly as possible, the injection will be designed to minimize the reliance on diffusive transport. Remediation of the less permeable zones in the subsurface will unavoidably entail diffusive transport and thus are expected to be the rate-limiting steps in the overall schedule for cleanup.

ERH technologies have been tested and implemented at several locations with site features similar to PORTS. ERH technologies consist of multiple arrays of vertical electrodes connected to a power source. Each array consists of multiple conducting electrodes in a pattern surrounding a neutral electrode. Arrays are expected to be 30 ft. to 40 ft. in diameter. Conducting electrodes require injection of a small quantity of an electrolytic solution. Upon application of a current, heating occurs to the soil between the electrodes. Electric current (heating) is computer controlled via installed temperature monitors. This technology provides more uniform heating of heterogeneous sedimentary materials than other delivery system driven technologies, such as steam stripping.

In implementing ERH, several weeks is required to increase the temperature of the soil and contained fluids to about 80° C, the volatilization point of TCE in the form of DNAPL. Heating is maintained for a sufficient time to volatilize the expected DNAPL. Once volatized TCE is extracted using vapor recovery technology such as soil vapor extraction (SVE) wells. Boreholes equipped with electrodes will also include SVE wells. Additional SVE wells may be installed to augment TCE recovery. Recovered vapors are collected or destroyed in an above ground treatment system, which may consist of vapor phase carbon or catalytic oxidation equipment. Heating of the subsurface to the point of volatilization of TCE will enable recovery via SVE. RAOs are expected to be met in the application area within five years of completion of heating. Due to the size of the source area, it may be subdivided into multiple sub-areas, each requiring heating over subsequent time periods. If RAOs are not met, technologies such as phytoremediation or modifications of other currently utilized technologies will be evaluated and implemented as necessary.

The X-701B Groundwater Area will be evaluated after five years of implementation of the alternative. Land use restrictions, in combination with groundwater treatment is expected to reduce the likelihood of exposure of current and future on-site workers and the general public to contaminated groundwater.

2.2 Reliability

Previous actions at PORTS for oxidant injection indicate that hydrogen peroxide, sodium permanganate, or potassium permanganate oxidant can be effectively delivered to the lower Minford clayey silt, the Gallia sand and gravel, and fractures in the top of the Sunbury shale. Oxidants have been proven to be effective in the destructive treatment of dissolved trichloroethene (TCE), the primary contaminant in the X-701B plume. The performance of the technology is evaluated through soil and groundwater-sampling techniques, allowing for refinements or optimization of the treatment processes as needed in response to actual site conditions.

Elimination of above ground collection, handling, storage and treatment of contaminants and treatment residuals simplifies the implementation of this remedy, enhancing its overall reliability.

The use of the evaluated technologies has been proven reliable at other sites. ERH has been shown to effectively heat the saturated and unsaturated soils with uniform heating of heterogeneous sedimentary materials such as clays and the upper portion of the Sunbury shale.

Groundwater monitoring will be used to determine the effectiveness of this alternative. Trained personnel will inspect and sample the groundwater monitoring wells. Maintenance of monitoring point wellheads will be relatively straightforward and can be successfully performed by PORTS personnel. Labor and materials required to maintain the monitoring point wellheads are expected to be readily available for at least 30 years.

2.3 Implementability

Installation of the oxidant injection system will be completed using standard drilling and construction equipment that is readily available. Oxidant delivery systems will utilize existing wells and other technologies such as prefabricated vertical wells. The actual injection technology will be determined during system design. The injection schedule will be flexible and designed to incorporate lessons learned as the program continues.

Installation of the ERH system will be performed using special techniques for constructing electrodes currently available through a limited number of contractors. The vapor recovery technology requires standard equipment that is readily available and because of the shallow depth to contamination is easily implementable at PORTS.

Because the U.S. Government is expected to occupy the site for the indefinite future, no additional deed and land use restrictions are required. Additional restrictions could be established if the status of the site changes in the future. Fugitive dust emissions must be considered and monitored for all construction activities. Adequate access is available to all affected areas.

2.4 Safety

Some safety hazards are expected to be encountered during construction activities. These hazards are not expected to be any greater than those experienced in private industry for operation of similar equipment.

Safety hazards present during operations include use of high voltages with potential for burns and electrical shock within the area of application of ERH. Additional hazards with ERH include the potential creation of steam and its migration.

Oxidant injection systems will include the delivery, storage, and use of a strong oxidizing agent. A project health and safety plan will address the safe handling of chemical usage.

Potential hazards to workers at the site will be mitigated through compliance with Occupational

Safety and Health Administration (OSHA) regulations and a site-specific health and safety plan. This plan will address the potential hazards associated with chemical hazards and heavy equipment use, such as drilling and excavating equipment, and other equipment, such as power generators, so as to minimize the risk to remediation workers. Utilities that pose a hazard to workers will be deactivated before construction. Such activities will be coordinated with adjacent facility operations to assure that potential worker hazards from other operations are minimized.

Implementation of this alternative is expected to pose no safety hazards for neighboring populations since the contaminants will remain on-site.

3. HUMAN HEALTH ANALYSIS

3.1 Short-Term Exposure Risks

The short-term exposure risks associated with implementation of this alternative will involve the potential for increased exposure of on-site workers (remediation workers) to contaminants during remedial system installation and monitoring activities. The associated risks will be minimized with implementation of, and adherence to, health and safety plans and as-low-as-reasonably-achievable (ALARA) principles.

In situ destruction of the contaminants minimizes the need for above ground collection, handling, treatment, and disposal of contaminants or treatment residuals. Minimization of these activities significantly reduces the short-term exposure risks to on-site workers.

Risks from operation and maintenance (O&M) activities should be no greater than risks incurred in private industry for comparable types of labor. Implementing this alternative should pose no short-term risk to neighboring populations because activities will be performed on-site.

3.2 Long-Term Exposure Risks

Long-term exposure risks fall within the acceptable range of risk since remedial actions will destroy or remove a significant mass of TCE, reducing the contamination levels of the plume. Ecological receptors are not expected to be impacted because migration of groundwater contamination to surface water bodies will be prevented by operation of the interceptor trench. Land use restrictions will prevent development of the Gallia sand and gravel as a drinking water source in the area. The long-term exposure risks associated with this alternative are acceptable because the remedial action is expected to satisfy the RAOs.

4. ENVIRONMENTAL ANALYSIS

Based on previous evaluations of similar activities, Alternative 8 has been determined to pose negligible risks to ecological receptors in the area and will have no adverse effects on wetlands, archeological and cultural resources, or critical habitat for threatened and endangered species. Use of oxidants will be managed to avoid any potential discharge of residual oxidants to wetland areas.

No adverse or beneficial influences on flood elevations will result because Quadrant II is not located in a 100- or 500-year floodplain.

No socioeconomic effects on the local community are anticipated from implementation of this alternative. The long-term risks associated with this alternative are not an issue because the baseline ecological risk assessment (BERA) states that, in its current condition, PORTS does not affect ecological receptors in Quadrant II.

5. INSTITUTIONAL ANALYSIS

Appendix B of the Quadrant II CAS/CMS Final Report provides a preliminary list of federal and state applicable relevant and appropriate requirements (ARARs) and other guidance that will potentially be considered for the remediation of the X-701B Groundwater Area. This alternative is expected to reduce contaminant concentrations to below Preliminary Remediation Goal (PRGs) where practicable and expected to meet RAOs.

6. COST ANALYSIS

The estimated costs associated with Alternative 8 are provided in Table 1. The basis for the estimate is presented below.

- The oxidant injection system in the source area is expected to include:
  - Installation of approximately 30 Gallia injection wells extending from the base of the Gallia (top of the Sunbury shale) to the lower unit of the Minford.
  - Installation of a planned infiltration gallery to inject oxidant in to the Minford near the zone of saturation.
- Planned oxidant injection over an approximately 4.5-acre area coinciding with the plume core between Perimeter Road and the IRM trench. The plume core oxidant injection system will include:
  - Installation of approximately 30 deep injection wells extending to the bottom of the Gallia.
  - Estimated screen length of deep injection wells is 20 ft., dependent on field conditions.
  - Planned installation of an infiltration gallery to inject oxidant into the Minford near the zone of saturation.
- The ERH system in this area will include:
  - Installation of multiple heating arrays, each containing up to six heating electrodes and one neutral electrode. The heating zone will extend from the lower Minford into the top of the Sunbury shale.

- Installation of a vapor recovery and treatment/collection system.

7. COMPARATIVE EVALUATION OF ALTERNATIVES

Direct comparisons between alternatives illuminate the advantages and disadvantages of one alternative over another. The same criteria as used in the detailed analysis are used for the comparative evaluation:

- technical analysis,
- human health analysis,
- environmental analysis,
- institutional analysis, and
- cost analysis.

Table 1. Summary of Costs for X-701B Groundwater Area, Alternative 8 Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Quadrant II CAS/CMS Alternative 8	Capital Cost ($ thousands)		O&M Cost ($ thousands)	
	Cost	Present Worth[a]	Cost	Present Worth[a]
General Requirements	1,531			
Oxidant Injection	10,808			
Electrical Resistance Heating	1,950			
Operations and Maintenance			5,495 (yr 1 – 10) 7,878 (yr 11 – 30)	
Base Actions Totals	14,289	13,969		9,972

[a]Costs are escalated per DOE guidance. Present worth costs for the study period calculated using discount rate of 5.8%.

This comparative evaluation compares Alternative 8 to previous alternatives presented in the Quadrant II CAS/CMS Final Report.

7.1 Technical Analysis

7.1.1 Performance

Alternative 1 was determined not to be effective in reducing exposures to contaminants. Alternative 2 was determined to be effective at reducing exposure to contaminants, but does not meet the RAOs. Alternatives 3 through 8 was determined to be effective in reducing the toxicity, mobility, and volume of contamination by eliminating and/or containing the source. Alternatives 3 through 8 are expected to be capable of meeting the RAOs. Alternative 8, which most fully utilizes an in situ treatment technology, minimizes possible contact with contaminants and the possibility to further spread them through releases. The X-701B Groundwater Area will be re-evaluated during the five year review.

7.1.2 Reliability

Alternative 2 relies on deed and land use restrictions to prevent exposure and direct contact with the contaminants. Deed and land use restrictions will reduce the potential for exposure to contaminated soil.

Alternatives 3 through 8 are reliable alternatives for removal of contaminants. These alternatives will require some O&M efforts to maintain their effectiveness. The greater O&M required for VER and steam stripping is offset by the shorter duration of these processes.

Alternatives that minimize mechanical operation tend to be more reliable. Alternatives utilizing VER and steam stripping will be less reliable because the systems require mechanical heating or extraction and vapor control.

7.1.3 Implementability

Alternatives 1 and 2 require no additional remedial activities and are the most easily implemented, requiring the least amount of time to implement.

Alternative 3 uses oxidant injection, VER, and phytoremediation to remove and treat contaminated groundwater. All three technologies have been implemented in a variety of hydrogeologic settings and are readily implementable. The time required to implement Alternative 3 is approximately 12 to 24 months.

Alternative 4 uses VER and steam stripping to eliminate contamination in selected areas of the X-701B Groundwater Area plume during the first two years. This is followed by groundwater extraction. All of these technologies have been demonstrated to remediate contaminated media at PORTS and other facilities. This alternative is readily implementable and the time required to implement Alternative 4 is approximately 12 to 24 months.

Alternative 5 uses VER to eliminate contamination in selected areas of the X-701B Groundwater Area plume during the first two years, followed by groundwater extraction. These technologies have been demonstrated to remediate contaminated media at other facilities. This alternative is readily implementable and the time required to implement Alternative 5 is approximately 10 to 18 months.

Alternative 6 uses groundwater extraction and bioremediation to eliminate contamination in selected areas of the X-701B Groundwater Area plume during the first two years, followed by groundwater extraction. Groundwater extraction has been demonstrated to effectively control and remediate contaminated media at PORTS and other facilities. Feasibility testing conducted on PORTS groundwater indicates that bioremediation may be effective for remediating contaminated groundwater. This alternative is readily implementable and the time required to implement Alternative 6 is approximately 10 to 12 months.

Alternative 7 uses oxidant injection and recirculation to eliminate contamination in the X-701B Groundwater Area plume for 6 months. Current studies indicate that oxidant injection will be effective for remediating contaminated groundwater. This alternative is readily implementable and the time required to implement Alternative 7 is approximately 15 to 24 months.

Alternative 8 uses oxidant injection followed by ERH to expedite remediation of the core plume and residual source areas. The oxidant injection technology has been successfully deployed in a variety of hydrogeologic settings, and is readily implementable at X-701B. Optimal methods for delivery of oxidant into the subsurface will be defined during design. This alternative will reduce the concentration of contaminants more quickly than any of the other alternatives evaluated. The time required to implement Alternative 8 is approximately 15 to 24 months.

7.1.4 Safety

Alternatives 1 and 2 pose the least safety risks. The implementation of any of Alternatives 3 through 8 will pose the greatest safety risks to workers during construction activities because these alternatives require remediation efforts within a contaminated area during which time workers could potentially be exposed to contaminated groundwater at treatment facilities.

Alternatives 3, 7, and 8 include the delivery, storage, and use of strong oxidizing agents.

7.2 Human Health Analysis

No short-term exposure risks to neighboring populations are associated with any of the alternatives. However, Alternatives 3 through 8 will present some short-term exposure risks to remediation workers and current on-site workers during construction activities.

Long-term risks are minimized with implementation of any of Alternatives 3 through 8 as a result of the reduction of groundwater contamination concentrations to levels that are within the acceptable risk range.

7.3 Environmental Analysis

Alternatives 3, 7, and 8 have been determined to pose negligible risks to ecological receptors in the area. It is expected that oxidant migration can be controlled and none of the alternatives should have any adverse effects on wetlands, archeological or cultural resources, or critical habitat for threatened or endangered species (these resources are not present in the X-701B Holding Pond and Retention Basins areas). Neither adverse nor beneficial influences on flood elevations will occur because Quadrant II is not located in a 100- or 500-year floodplain. No socioeconomic effects on the local community are anticipated from implementation of any of the alternatives.

7.4 Institutional Analysis

Alternatives 1 and 2 will not meet all of the preliminary ARARs identified in Appendix B of the Quadrant II CAS/CMS Final Report. Alternative 4 is expected to meet all preliminary ARARs and all RAOs with the exception that Contaminants of Concern (COCs) may impact surface water at X-230J7 Holding Pond. Alternatives 3, 5, 6, 7, and 8 are expected to meet preliminary ARARs and groundwater RAOs.

7.5 Cost Analysis

Alternatives estimated cost comparisons are presented in Table 2

Table 2. Summary of Alternative Analysis for the X-701B Groundwater Area Portsmouth Gaseous Diffusion Plant, Piketon, Ohio

Alternative	Technical Analysis	Human Health Analysis	Environmental Analysis	Institutional Analysis	30-Year Present Worth Costs ($1,000s) Capital/O&M
1 – No Action	Readily implementable. Not effective at reducing exposure to contaminants.	No short-term risk. Long-term exposure to on-site workers and off-site population.	No risk to environmental receptors.	Does not meet all RAOs and preliminary ARARs.	0/0
2 – No Further Action	Readily implementable. Readily dependent on continued DOE ownership of property.	Short-term risk to remediation workers. Long-term risk reduced by continued operation of existing treatment facilities.	No risk to environmental receptors.	Does not meet all RAOs and preliminary ARARs.	0/10,971
3 – Oxidant Injection, VER, and Phytoremediation	Readily implementable. Proven and reliable technologies. Difficult due to combining multiple technologies.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	Potential for oxidant migration to surface water initially disrupting ecological receptors but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	9,167/7,218*
4 – VER and Steam Stripping	Readily implementable. Processes have been demonstrated to be reliable. Soil heterogeneities may reduce effectiveness of heating.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental receptors.	Can meet all RAOs and preliminary ARARs with the exception that COCs may impact surface water.	10,516/16,003
5 – VER	Readily implementable. Processes had been demonstrated to be reliable. Presence of DNAPLs may extend cleanup period.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental receptors.	Can meet all RAOs and preliminary ARARs.	2,348/17,665
6 – Groundwater Extraction and Bioremediation	Readily implementable. Process had been demonstrated to be reliable. Presence of DNAPLs may extend cleanup period.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	No risk to environmental receptors.	Can meet all RAOs and preliminary ARARs.	2,781/15,503
7 – Oxidant Recirculation	Readily implementable. Use of proven and reliable technology coupled with demonstrated in situ method	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	Potential for oxidant migration to surface water initially disrupting ecological receptors but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	1,560/17,315
8 – Oxidant Injection	Readily implementable. Proven and reliable technology.	Short-term risk to remediation workers. Long-term risk minimized by reduction of contaminant concentrations.	Potential for oxidant migration to surface water initially disrupting ecological receptors but is not expected to result in permanent effects.	Can meet all RAOs and preliminary ARARs.	13,969/9,972

*O&M costs do not include the cost of treatment of water from the X-705 Decontamination Building sumps and the IRM trench

Memo

I-20035-0010

To: Donnie Locke
From: Janie Croswait Janie
Date: July 21, 2003
Subject: Transmittal of Requested Document

Enclosed, please find a copy of the following requested document:

- *Environmental Assessment Quadrant II Corrective Measures Implementation at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*
  Includes "Finding of No Significant Impact" (FONSI)
  DOE/EA-1459 January 2003

If you have any questions or need additional information, please call me at 289-3317.